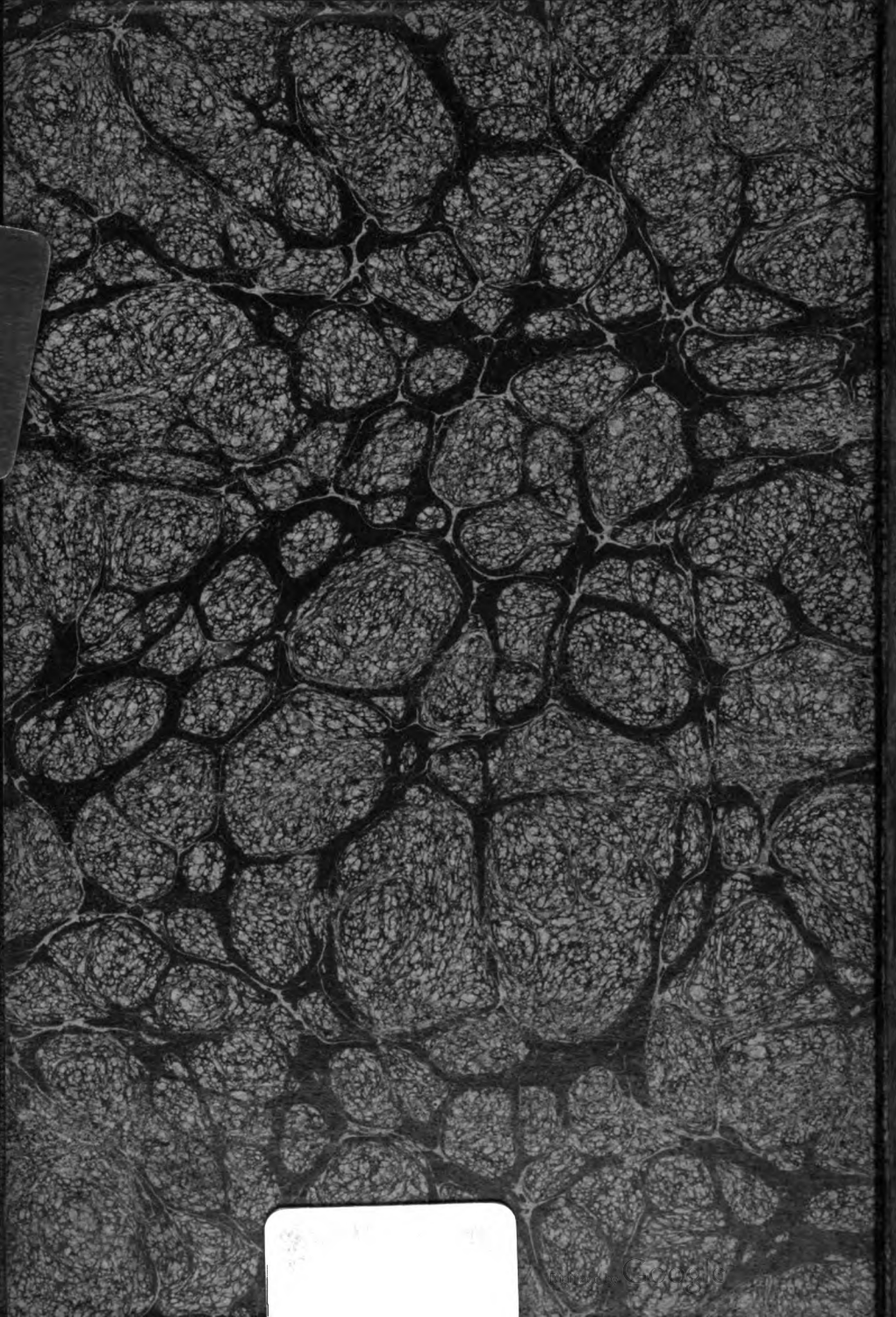

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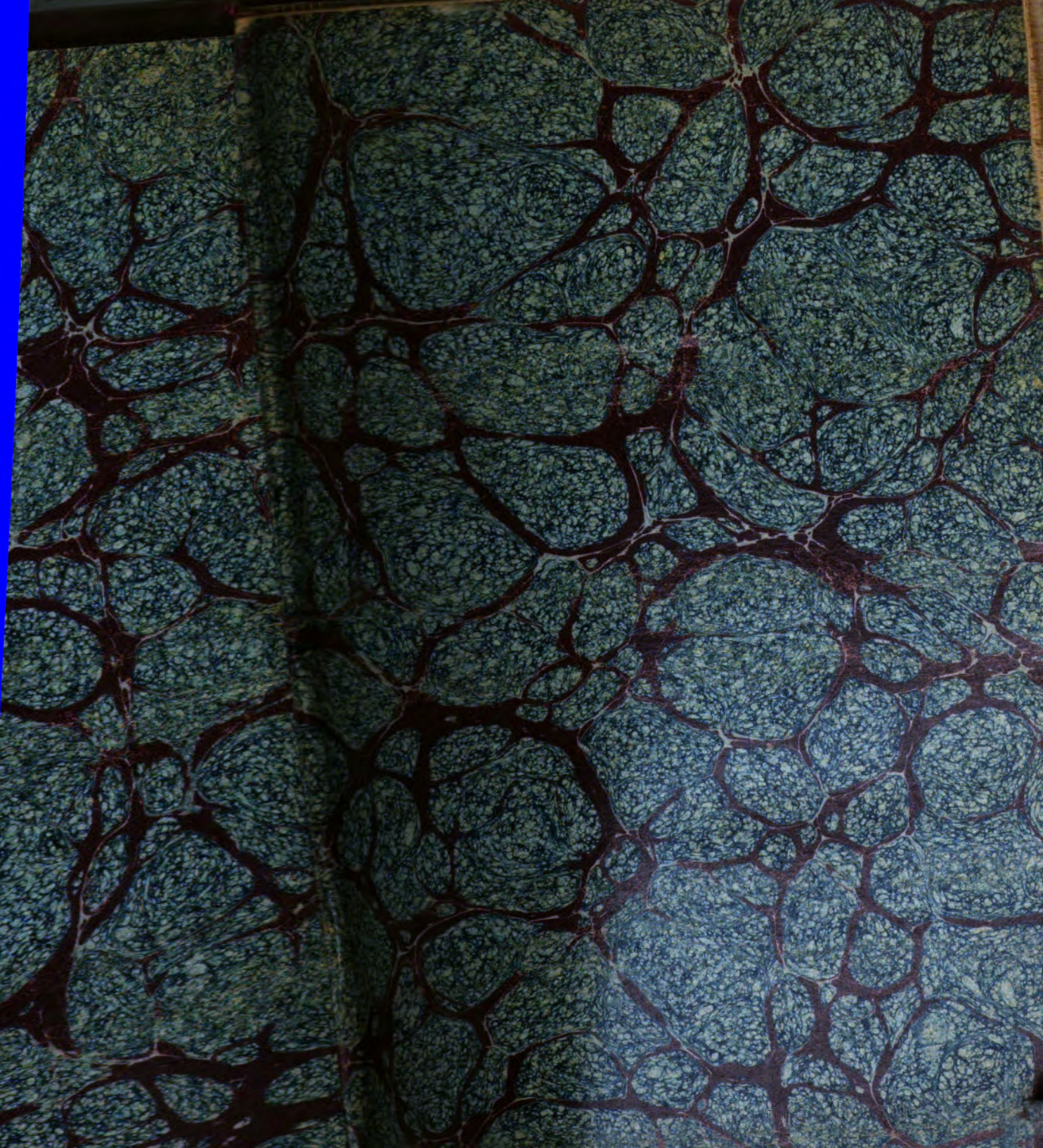
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Artillery Select Committee

Meeting 185. Article 686

An Instrument for searching Vents proposed by

Captain J. L. Barrow.

Com^d of Ordnance H. S. Force.



MEETING 185.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL G. CONRAN, BRIGADIER COMMANDANT OF ARTILLERY.*Artillery Depot, Saint Thomas' Mount, 29th March 1855.***PRESENT.**

LIEUT. COLONEL P. J. BEGBIE, *Commanding 5th Battalion Artillery.*
 MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 MAJOR G. ROWLANDSON, *Acting Director Artillery Depot.*
 MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*
 MAJOR W. M. GABBETT, *Acting Superintendent Gunpowder Manufactory.*
 LIEUTENANT S. RIPPON, *Adjutant 5th Battalion Artillery.*
 LIEUTENANT R. MORTON, *Adjutant 2nd Battalion Artillery.*

ARTICLE 685.

(Subject withdrawn.)

ARTICLE 686.

**AN INSTRUMENT FOR SEARCHING VENTS, PROPOSED BY
 CAPTAIN J. L. BARROW, COMMISSARY OF ORDNANCE
 HYDERABAD SUBSIDIARY FORCE. PLATE 81.**

The following document is laid before the Committee.

(a) Dated 9th December, 1854. *Letter^(a) from Captain J. L. Barrow, to the Director Artillery Depot, submitting with the sanction of the Commandant of Artillery an "Instrument intended as a vent searcher for consideration of the Artillery Select Committee with a view to its being if approved of, included in the list of Equipments for Batteries of Horse and Foot Artillery."*

OPINION.—The Committee approve of the principle of the Instrument, and consider that a limited supply for use in Arsenals, where there are many guns to be looked to, may be of advantage, but do not recognize its necessity in Batteries, as sufficiently urgent, to supersede the objection to an unnecessary multiplication of the already numerous articles required for a Battery.

Extracts from the Proceedings of the Military Board, No. 8656, dated 13th April, 1855.

DECISION.—The Military Board, resolve to forward sketch to the Principal Commissary of Ordnance, with instructions to make up a few searchers, on the plan shown in the drawing.

ARTICLE 687.

ON AN EXPERIMENTAL LIMBER FOR ALL HEAVY FIELD GUNS AND HOWITZERS. PLATE 82.

(a) Meeting 182, Article 673, Artillery Records, page 364.
(b) Meeting 183, Article 680, Artillery Records, page 400.

The Select Committee recommended^(a) the adoption of one pattern Heavy Field Limber for all Heavy Ordnance, also^(b) that in future constructions the fixed Pintrail and swivel pole be of the full length of 8 feet.

An Experimental Limber for all Heavy Field Guns and Howitzers having been constructed, the same is submitted^(c) to the Select Committee for their report.

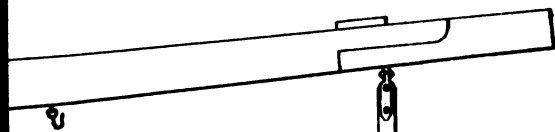
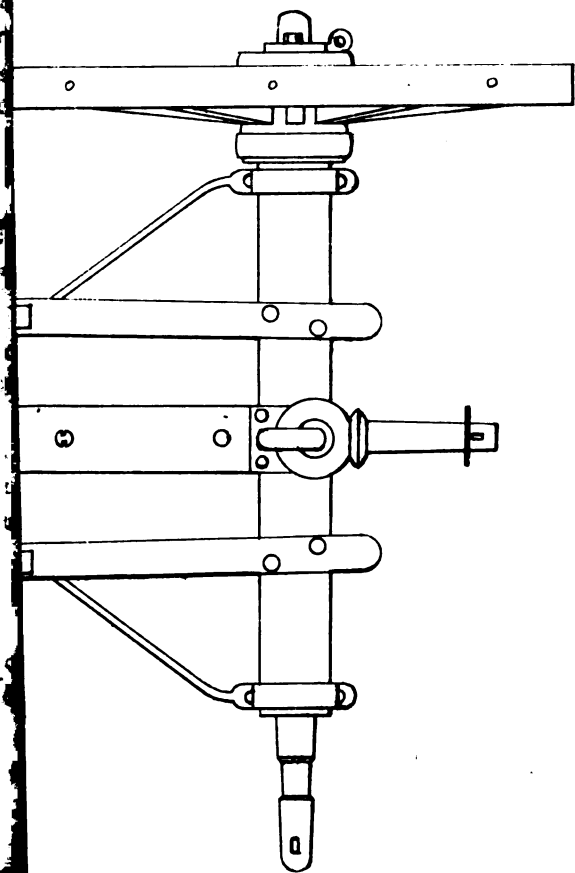
The undermentioned document is laid before the Committee
Register of an Experimental Limber for all Heavy Field Guns and Howitzers.

OPINION.—The Committee consider the Limber now submitted, meets every requisition resulting from previous experiments, and observe that a deviation in the pintrail and loop, from the proposed “fixed pintrail and swivel pole,” has been made at the suggestion of the Superintendent of the Gun Carriage Manufactory, with the concurrence of the Military Board, and the weight and height of wheels reduced to a par with the Royal Artillery pattern, both which alterations they deem improvements; and now recommend that the Limber be submitted without delay, to the test of a march to a distant Station, with a view to its formal adoption as the established pattern.

Extract from the Proceedings of the Military Board, Nos. 8662. and 428, dated 13th April and 15th May, 1855.

DECISION.—The Experimental Limber with a Heavy Field 24 Pdr. Carriage to be sent to the Grand Arsenal for despatch by land to Secunderabad and Saugor for experiment.

Howitzers.



ARTICLE 688.

PERPENDICULAR FOR MARKING OUT THE CORRECT POSITION OF THE ELEVATING SCREW AND BOX IN FITTING THE SAME TO A GUN CARRIAGE, BY CONDUCTOR CURRAN AND STORE SERJEANT BOWMAN OF THE GUN CARRIAGE MANUFACTORY. PLATE 83.

The following documents are laid before the Committee.

(a) No. 6437, dated 19th January, 1855.

(b) No. 19, dated 13th January, 1855.

Extract from the Proceedings of the Military Board^(a) forwarding letter from the Superintendent Gun Carriage Manufactory,^(b) submitting a Machine termed a "Perpendicular" invented by Conductor Curran and Store Serjeant Bowman, with a description of the use to which it is applied.

OPINION.—The Committee consider the principle of this Instrument sound, and practical, and doing great credit to the ingenuity of Conductor Curran, and Store Serjeant Bowman.

ARTICLE 689.

PROPOSED METHODS OF SPIKING ORDNANCE.

The undermentioned Documents are laid before the Committee.

(a) Dated 12th February, 1855.

1. *Letter*^(a) from Major W. H. Miller, 4th Battalion Artillery, to the Director Artillery Depot; recommends abolition of present ragged and single spring spikes, as faulty and nearly useless, for reasons specified, and the re-introduction of the discarded double spring, and round smooth spikes, the latter of peculiar construction, and reverts to a reliever^(b) formerly recommended by him but not adopted, as a desideratum in the service.

(b) Meeting 126, Article 364, Artillery Records, page 327 and Plate 57.

(c) No. 111, dated 14th February, 1855.

2. *Letter*^(c) from Colonel Æ. Shirreff, Commanding Horse Brigade Artillery, to the Director Artillery Depot; submitting spikes smooth with

bulge spring back, and both ends tapped with male or female screws to fit a handle with corresponding tap, capable also of being used as a pricker, also as a safety key to guns when sent from one Arsenal to another, under weak guards of Sepoys, and when guns are left at a distance from Cantonment during Annual Practice.

Three modified patterns of a proposed spike are also forwarded.

(d) Vide remark (b) also Select Committee Proceedings, Meeting 67, Art. 184, Artillery Records, page 29.

Former proceedings^[d] on the subject of spiking Ordnance are laid before the Committee.

OPINION.—The Committee having fully considered the several spikes proposed for adoption, in amendment, or supersession, of those now in use, with due reference to former proceedings on the subject, give the preference to the Bulge temporary Spike,* of Colonel Shirreff's proposal, with male screws at the ends, which they consider better than that with the female screws, and would suggest its addition to the spikes now in use, but would point out the necessity of such spikes being furnished solely from one source, as it is obviously indispensable to their utility, that one and the same tap be used throughout their manufacture. They do not deem it advisable to recommend at present any alteration in existing spikes, though they are not satisfied that this important article of store for the Artillery, has been as yet satisfactorily disposed of.

* Vide Plate 64.

Extract from the Proceedings of the Military Board, No. 8647, dated 13th April, 1855.

Colonel Shirreff.

DECISION.—The Principal Commissary of Ordnance to be requested to make up a few spikes, on the plan proposed by

ARTICLE 690.

ON THE ACTUAL DIMENSIONS OF HALF WROUGHT TIMBER REQUIRED FOR THE CONSTRUCTION OF GUN CARRIAGES, &c.

The following documents are laid before the Committee.

Asn of the Elev^d Screw Box

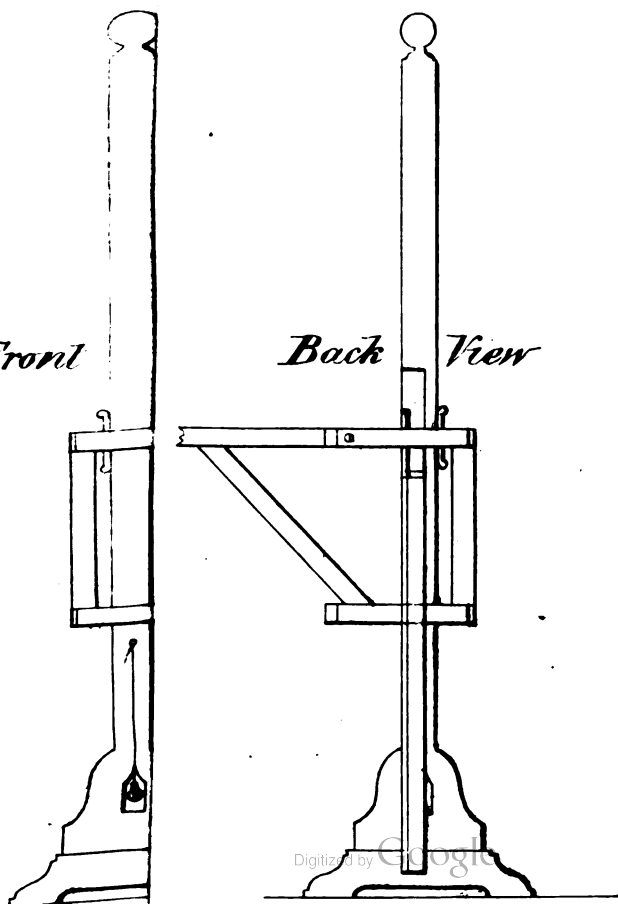
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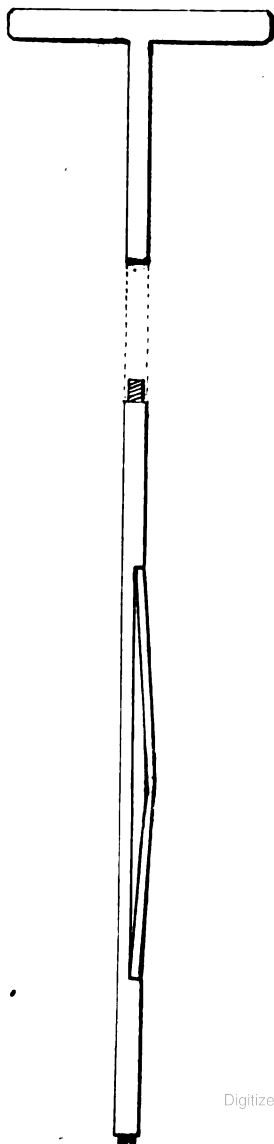
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Artillery Select Committee
Meeting 185, Article 689.

Spike proposed by Col. A. Shirreff
Commanding H. Brigade



(a) No. 7635, dated 27th
February, 1855.

1. *Letter^(a) from the Secretary Military Board, to the Brigadier Commandant of Artillery*, requesting that the subject of the dimensions of Timber necessary for the purposes of the Gun Carriage Manufactory may receive the early consideration of the Artillery Select Committee.

(b) No. 136, dated 23d
February, 1855.

2. *Letter^(b) from the Superintendent Gun Carriage Manufactory, to the Secretary Military Board*, submitting a list of the finished dimensions of the parts of Carriages, &c. for which Teak planks of the dimensions asked, are intended.

	Length.		Breadth.		Thick- ness.	
	Ft.	ins.	Ft.	ins.	Ft.	ins.
Cheeks of Heavy Field Carriages, 24 Pdr.....	12	0	1	4	0	5
Axle cases " " " "	3	10	0	8	0	9
Felloes " " " "	3	0	0	6½	0	4½
Half Beams of Light Field Carriages, 24 Pdr.....	8	10	0	6	0	11½
Cheeks of Garrison Carriages (in 2 pieces).....	6	6½	2	8½	0	6½
" " Transport Carriages.....	12	0	0	8	0	5
" " 8 Inch Traversing Platforms (in 2 pieces)	16	0	0	10	1	2
" " Gyns..... { Square.....	20	0	1	1½	0	6½
" " " " " " " " " " " " { Triangular.....	17	6	1	0	0	6
Axle cases of Light Field Carriages.....	3	8	0	6	0	6
" " " " Light Field Limbers.....	3	8	0	6	0	7
Perches for Waggon.....	9	3½	0	5½	0	6

3. *Table of dimensions of Half Wroughts, Military Board's Circular. No. VI. of 21st February, 1854, page 2.*

OPINION.—The Committee observe that several of the dimensions in the list of finished half wroughts, furnished by the Superintendent of the Gun Carriage Manufactory, double those mentioned as the extreme limit in the Military Board's letter, and consider the experience of the head of the Gun Carriage Manufactory can alone determine the scantling of timber, necessary to provide for the wants of the Department; and recognizing those wants as paramount in their importance, beg respectfully to record their opinion, that the official statement of the Superintendent is the only responsible and conclusive guide for the determination of the necessary Timber, the demand for which is not of recent ex-

perience, but has been invariably felt and met hitherto, and cannot now with propriety be questioned.

ARTICLE 691.

ON IRON 12 PDR. GUNS OF DIFFERENT DESCRIPTIONS AND LENGTHS BEING FIRED FROM THE SAME CARRIAGE.

The following documents are laid before the Committee.

(a) No. 7709, dated 27th February, 1855. *1. Letter^(a) from the Secretary Military Board, to the Brigadier Commandant of Artillery* forwarding copies of letters on the subject of four patterns of 12 pounder guns being fired on the 12 pounder Carriage, and requests that the subject may be brought before the Artillery Select Committee.

(b) No. 130, dated 21st February, 1855. *2. Letter^(b) from the Superintendent Gun Carriage Manufactory to the Principal Commissary of Ordnance,* sending measurements of four 24 pounder Heavy Field Guns received from the Arsenal and requests to be informed for which of them he is to build the Carriage intended for all; being of opinion, from past experience, that one Carriage will not suit all these pieces.

(c) No. 381, dated 22d February, 1855. *3. Letter^(c) from the Principal Commissary of Ordnance to the Secretary Military Board,* suggesting that the above subject be referred to the Brigadier Commandant of Artillery or to the Select Committee.

(d) No. 53, dated 5th February, 1855. *4. Letter^(d) from the Brigadier Commandant of Artillery to the Secretary Military Board,* stating his opinion, from experiment tried, that all the four patterns of 12 pounders differing in length and weight are capable of being fired from the same 12 pounder carriage with stronger semelle, and deprecates rejection of the various lengths of 12 pounders as depriving us of a valuable field of choice, &c. &c.

(e) No. 7146, dated 9th
February, 1855.

5. *Extract^(e) from the Proceedings of the Military Board*, directing the Principal Commissary of Ordnance and Superintendent Gun Carriage Manufactory in communication to select one of each of the 12 pounder Iron Guns in store and report on the Carriage adapted for all the different pieces as proposed by the Brigadier Commandant of Artillery, in which the Board entirely concur.

(f) No. 466, dated 8th
March, 1855.

6. *Letter^(f) from the Principal Commissary of Ordnance to the Brigadier Commandant of Artillery*, forwarding the dimensions of five 12 pounders in store.

OPINION.—The Committee concurring in the views expressed in the Commandant of Artillery's letter of the desirableness, if possible, of retaining the choice of pieces, without the addition of so many separate carriages for the same calibre, recommend the adjustment of a Carriage for use with the 12 Pdr. of 8½ feet, with a semelle of the strongest manufacture, to be tested with all the other lengths of 12 Pdr. guns, as the best practical means of testing the disputed feasibility of the adoption of one carriage for all.

Extract from Proceedings of the
Military Board, No. 8669, dated
13th April, 1855.

DECISION.—The Superintendent Gun Carriage Manufactory to be instructed to construct a Carriage adapted to receive the various descriptions of 12 Pdr. guns at present in the Grand Arsenal.

ARTICLE 692.

ON TWO EXPERIMENTAL CARRIAGES (12 PDR. HOWITZER AND 6 PDR. GUN) OF THE ESTABLISHED PATTERN, CONSTRUCTED OF MIXED WOODS.

The following documents are laid before the Committee.

(g) No. 4943, dated 24th
October, 1854.

1. *Letter^(g) from the Secretary Military Board to the Brigadier Commandant of Artillery*, requesting that the two Carriages constructed of

mixed woods might be submitted to the Artillery Select Committee with reference to their former report^(b) on the weights and kinds of woods; and annexes a statement showing the difference in weight between the Light Field Carriages of the established pattern constructed of mixed woods and those entirely of Teak.

Calibre.	Mixed Woods.	Teak.	Difference.
	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.
24 Pdr. Howitzer Carriage.....	11 3 0	11 1 14 $\frac{3}{4}$	0 1 13 $\frac{3}{4}$ or 41 $\frac{3}{4}$ lbs.
12 " " " "	11 0 14	10 3 14	0 1 0 or 2 $\frac{1}{2}$ lbs.
9 " Gun " "	10 3 24	10 1 25 $\frac{3}{4}$	0 1 4 $\frac{7}{10}$ or 32 $\frac{7}{10}$ lbs.
6 " " " "	10 0 24	9 2 22	0 2 2 or 58 lbs.

(c) Dated 20th October, 1851.

2. Register^(c) of two Experimental Carriages made of mixed woods.

(d) Dated 20th October, 1854.

3. Statement^(d) showing the comparative weights of 12 Pdr. Howitzer and 6 Pdr. Gun Carriages established pattern, constructed of Teak and of mixed woods.

(e) Dated 7th November, 1854.

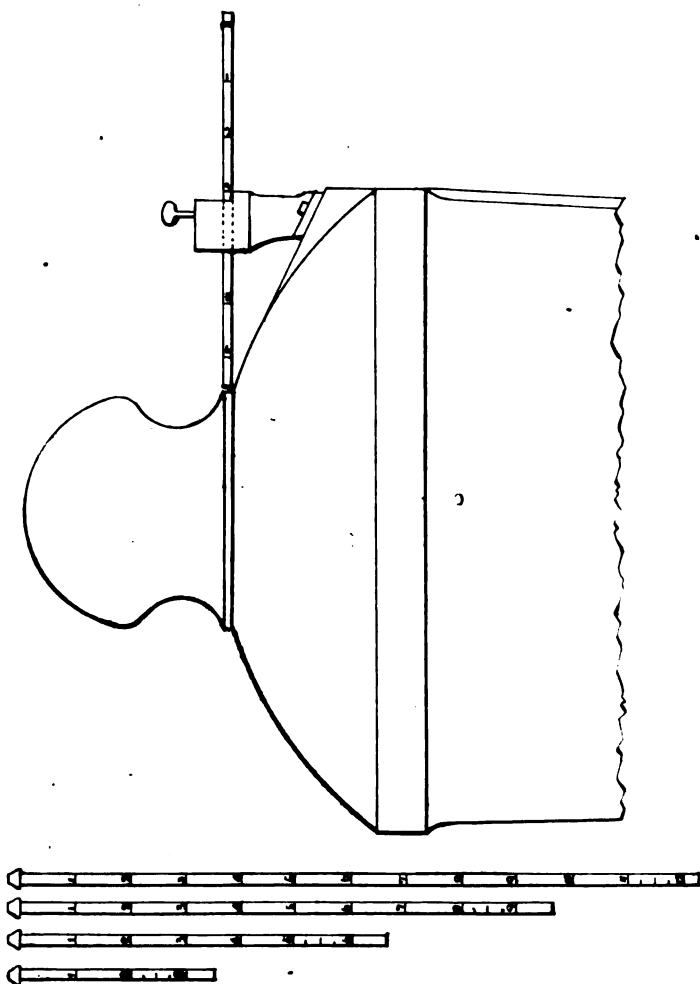
4. Proof Report^(e) of Experimental 12 Pdr. Howitzer and 6 Pdr. Gun Carriages established pattern, constructed of mixed woods.

OPINION.—The Committee in accordance with the opinion expressed in their Proceedings, Meeting 183, Article 679, on this subject, in which the admission of mixed woods was conceded on the condition that the weights of the established patterns be not exceeded, consider that although those limits have not been preserved in the Experimental Carriages of mixed woods now submitted, the excess is not so considerable as to outweigh the advantage of the introduction of Saul and Peddowk, in giving increased strength and efficiency to the Carriages, and therefore recommend its continuance, with due regard to the very important consideration of weight in Light Field Carriages.

Artillery Select Committee.

Meeting 186, Article 693.

*A proposed method of fitting the 56 P^{dr} Guns
with Tangent Scales*



inches 12 6 0

MEETING 186.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF MAJOR GENERAL F. BLUNDELL, C. B., COMMANDANT OF ARTILLERY.

Artillery Depot Saint Thomas' Mount 3rd September 1855.

PRESENT.

LIEUT. COL. P. HAMOND, *Acting Principal Commissary of Ordnance.*

LIEUT. COL. P. J. BEGBIE, *Commanding 5th Battalion Artillery.*

MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*

MAJOR G. ROWLANDSON, *Acting Director Artillery Depot.*

MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*

MAJOR W. M. GABBETT, *Acting Superintendent Gun Powder Manufactory.*

LIEUTENANT S. RIPPON, *Adjutant 5th Battalion Artillery.*

ARTICLE 693.

PROPOSED METHOD OF FITTING THE 56 PDR. GUN WITH TANGENT SCALES. PLATE 85.

The following Documents are laid before the Committee.

(a) No. 34 dated 26th
January 1855.

1. *Letter^(a) from the Brigadier Commandant of Artillery to the Secretary Military Board.* Suggesting that all 56 pdr., 8 inch, and other iron guns be bored to receive, and be fitted with Tangent Scales.

(b) No. 1124 dated 5th
June 1855.

2. *Letter^(b) from the Acting Principal Commissary of Ordnance to the Secretary Military Board.* Forwarding a Memorandum from Overseer William Patterson, detailing the mode he proposes for fitting 56 pdr. guns with Tangent Scales:—"which is simply, that "instead of one Scale of the full length of 27·767, to make "four scales, one for 3°, one for 6°, one for 9°, and the other "for 12°. The advantages to be gained by this method, are, "that no groove in the breech would be required."

(c) No. 1064 dated 27th
June 1855.

3. *Extract from the Proceedings of the Military Board^(c).* Forwards to the Major General Commandant of Artillery the above letter from the Acting Principal Commissary of Ordnance, with models of

the Patch and 4 Tangent Scales and requests that the subject be laid before the Artillery Select Committee.

OPINION.—The Committee entirely approve of the principle of Mr. Patterson's suggestion, which they consider does him great credit, and as the Heavy Guns recently received from England are found to be fitted with scales of similar description they recommend their adoption.

Extract from Proceedings of the Military Board, No. 3621, dated 24th September 1855.

DECISION.—Two 56 pdr. guns to be fitted with Tangent Scales in the grand Arsenal, and reported upon. The 56 pounder guns at Singapore to be also provided with Tangents. The new 68 pounders to have Tangents affixed, if not supplied in England.

ARTICLE 694.

COPPER MEASURES PROPOSED FOR LIGHT FIELD BATTERIES.

The following Documents are laid before the Committee.

(a) No. 440 dated 7th December 1854.

1. *Letter^(a) from the Brigadier Commandant of Artillery to the Secretary Military Board.* Recommends that similar copper measures to those authorized in Bengal be added to the outfit of Light Field Artillery under this Presidency.

(b) No. 5837 dated 22d December 1854.

2. *Letter^(b) from the Secretary Military Board to the Acting Principal Commissary of Ordnance.* Requests that sets of copper measures may be prepared for the approval of the Brigadier Commandant of Artillery and the Artillery Select Committee.

(c) No. 1160 dated 11th June 1855.

3. *Letter^(c) from the Acting Principal Commissary of Ordnance to the Major General Commandant of Artillery.*—Forwards sets of copper powder measures for approval.

(d) No. 243 dated 19th June 1855.

4. *Letter^(d) from the Major General Commandant of Artillery to the Secretary Military Board.*—Recommends two additional measures one

to contain $1\frac{1}{2}$ lbs. for the exercise of 9 pdr. guns, and the other 1 lb. for the exercise of 12 pdr. Howitzers.

5. *Letter from the Acting Principal Commissary of Ordnance to the Major General Commandant of Artillery.*—Returns two sets of copper powder measures, with the two additional measures as recommended, and annexes a Memorandum of their dimensions, and quantities of powder which they will contain.

MEMO.

Dimensions and Contents of two sets of Copper Measures made up at the Grand Arsenal.

	Contents of each measure.		Interior dimensions.		Description of Powder used in testing the measures.
			Depth.	Diameter	
	lbs.	oz.	ins.	ins.	
9 PDR. BATTERY.					
1 Measure copper for service charges Gun 9 Pr.	2	4	4.4	4.6	C. P.
1 " " " " " Howr. 24 "	2	...	4.3	4.3	C. P.
1 " " " Exercise " Gun 9 "	1	12	4.16	4.12	C. P.
1 " " " bursting com. Shell Howr. 24 Pdr.	...	10	2.58	3.13	M. P.
1 " " " " S. C. Shot Gun 9 "	...	3½	1.81	2.21	M. P.
1 " " " " " Howr. 24 "	...	6	2.0	2.76	M. P.
6 PDR. BATTERY.					
1 Measure copper for Service charges Gun 6 "	1	8	4.01	3.96	C. P.
1 " " " " " Howr. 12 "	1	4	3.6	3.76	C. P.
1 " " " Exercise " " 12 "	1	...	3.29	3.6	C. P.
1 " " " bursting com. Shell Howr. 12 Pdr.	...	5	2.28	2.36	M. P.
1 " " " " S. C. Shot Gun 6 "	...	2½	1.6	2.1	M. P.
1 " " " " " Howr. 12 "	...	4½	2.28	2.22	M. P.

(Signed.) P. HAMOND, Lieut. Colonel,
Acting Principal Commissary of Ordnance.

OPINION.—The Committee concur in the recommendation by the Major General Commandant of Artillery, for the adoption of these measures, by which a great saving of time and trouble will be effected in the preparation of Cartridges.

2. Care will be requisite to ensure a correct use of them ; the Powder should be merely poured in, and smoothed off, by a piece of wood, level with the top without shaking the measure, doing which causes serious increase to the quantity of Powder and weight of the Cartridge, (as much as $2\frac{1}{2}$ ozs. in a 2 lb. measure.)

DECISION.—The Military Board in Extract from their Proceedings.^(a)—Resolve that it appears advisable that the number of measures copper, and their size and contents, should be defined for siege Trains, and Light Field Batteries.

In Bengal the following Powder measures are allowed for the Siege Train.

Number allowed.

Measures copper Powder 8 lbs.					
"	"	"	6 "	$1\frac{3}{4}$	} To every 5 pieces of Ordnance or to fewer.
"	"	"	5 "	$1\frac{1}{2}$	
"	"	"	4 "	$1\frac{1}{4}$	
"	"	"	3 "	1	
"	"	"	$2\frac{1}{2}$ "	1	
"	"	"	$2\frac{1}{4}$ "	$\frac{3}{4}$	
"	"	"	2 "	$\frac{1}{2}$	
"	"	"	$1\frac{1}{2}$ "	$\frac{1}{2}$	
"	"	"	$1\frac{1}{4}$ "	$\frac{1}{2}$	
"	"	"	1 "	$\frac{1}{2}$	
"	"	Spherical case sets $1\frac{1}{2}$, one to every 5 guns or 8 Inch Howitzer, or to fewer.			

For the Field Batteries, the following Copper measures are allowed.

9 Pounder Battery.

Measures copper for 9 Pdr. charges	$2\frac{1}{4}$ lbs.	No.	1.
„ „ „ 24 „ Howr. „ 2 „ „			1.
„ „ „ Bursting com. shell 12 ozs. „			1.
„ „ „ „ Shrapnell 9 Pdr. 4 „ „			1.
„ „ „ „ „ 24 „ Howr. 6 ozs. No.			1.

6 Pounder Battery.

Measures copper for 6 Pdr. charges	$1\frac{1}{2}$ lbs.	No.	1.
„ „ „ 12 „ Hwr. „ $1\frac{1}{4}$ „ „			1.
„ „ „ Bursting com. shell 5 ozs. „			1.
„ „ „ „ Shrapnell 6 Pdr. $2\frac{1}{2}$ „ „			1.
„ „ „ „ „ 12 „ How. $4\frac{1}{2}$ „ „			1.

It appears by the Bengal Plates, (Plate 14) attached to the Bengal Artillery Tables, that the diameter and height of the measures in use in Bengal are not made equal, the dimensions being as follows :—

	Inches.		Inches.
8 lbs. Measure	$7\frac{1}{16}$ in diameter	by	$5\frac{5}{16}$ in height.
6 „ „	$3\frac{5}{16}$ „	„ „	$3\frac{7}{16}$ „
$2\frac{1}{2}$ ozs. „	$2\frac{1}{16}$ „	„ „	$1\frac{1}{2}$ „
8 „ „	$2\frac{5}{16}$ „	„ „	$2\frac{5}{16}$ „

As Powder measures are exceedingly useful in facilitating the loading of Pieces, and in filling Shells, it will be advisable to have experiments made to ascertain the most suitable dimensions, and the Board therefore resolve to request the Principal Commissary of Ordnance to undertake these experiments, ascertaining from the Superintendent Gun Powder Manufactory the density of our Gun Powder, with a view to regulate the dimensions of the measures, but having regard to the kinds of Gun Powder used for loading Pieces, and for Spherical case shells.

The most convenient size for these Powder Measures will

probably be found to be cylinders having the diameter to the height as 2 to 3.

The Board will be ready to afford any further aid which may be required by the Principal Commissary of Ordnance.

ARTICLE 695.

ON LENGTHENING THE BEAMS OF ALL LIGHT FIELD CARRIAGES, AND INCREASING THE SCANTLING OF THOSE CONSTRUCTED OF TEAK WOOD.

The following Documents are laid before the Committee.

(a) No. 406 dated 6th June 1855. 1. *Letter^(a) from the Superintendent Gun Carriage Manufactory to the Secretary Military Board*, proposing the following arrangements "with respect to the increased scantling for all Beams of Light Field Carriages of the Established pattern."

Calibre.	Present length of Beams.	Addition.	Proposed length.
6 Pdr.	105½ inches.	6½ inches.	112 inches.
9 "	108 "	4 "	112 "
12 "	106 "	6 "	112 "
24 "	106 "	6 "	112 "

"The angle of the trail will thus be lessened by one degree and a trifle more.

"The depth of all Teak wood beams throughout the entire length to be increased half an inch. Saul and Peddowk beams to retain their present depth.

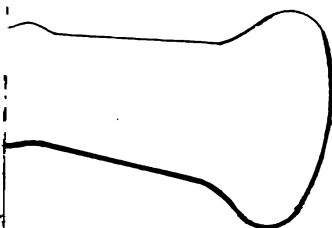
(b) No. 1066 dated 11th June 1855. 2. *Extract from the Proceedings of the Military Board.* ^(b)—Forwards copy of the above letter and directs that the question of lengthening the beam &c. be kept separate from the defective wood of the Howitzer Carriage.

OPINION.—The Committee being informed by the Superintendent of the Gun Carriage Manufactory in his place as

*Pa.
C.*

Plate 86

Colonel A. Shirreff



*h Gage
d screw
nife
age
lor.*

H. J. Kouwen Lithog.

Member, that a Carriage of the proposed construction is now in progress, consider it advisable to suspend their opinion until in possession of the result of the trial.

(c) No. 673 dated 25th
September 1855.

Extract from, letter^(c) from the Superintendent Gun Carriage Manufactory to the Secretary Military Board.—"I have the honor to state
"that the advantages from the alterations I propose in the
"experimental Carriage under construction are, that a Teak
"wood beam with an increased length and scantling will
"probably recoil easier, and be better able to resist the shock
"in firing, than a shorter beam with smaller scantling.

"2. My intention is to place the eye bolts in this ex-
"perimental carriage as they are in the G. O. G. pattern,
"passing through the axle in three places and so making
"three perforations instead of one. I conceive that what
"answers in Bengal may be equally advantageous here, that
"by bolting the body to the axle in three places instead of
"one must unite the whole machine more compactly together,
"and prevent the shake which I believe will inevitably take
"place if the bolts are neither through the axle or its case
"as suggested by the Commandant of Artillery."

ARTICLE 696.

ON A SADDLER'S PLOUGH FOR CUTTING LEATHER FORWARD-
ED BY COLONEL SHIRREFF, COMMANDING HORSE BRIGADE.
PLATE 86.

The following Document is laid before the Committee.

(a) No. 305 dated 29th
May 1855.

*Letter^(a) from Colonel E. Shirreff Com-
manding Horse Brigade, to the Director
Artillery Depot,* with a Memorandum explanatory of the
Saddler's Plough, its improvements and use.

Memorandum of the different parts of a Saddler's Plough
Gauge.

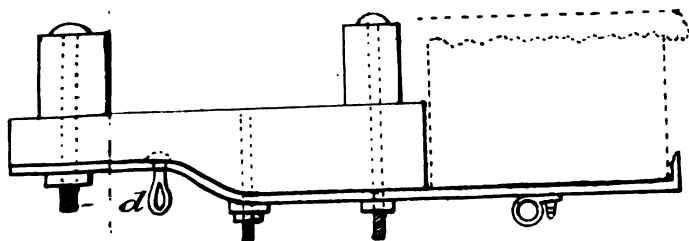
- No. 1. Knife and handle.
2. Body.*
3. Scale.
4. Gauge.
5. Elevating Roller and Screw.
6. Fixing screw of the Knife.
7. Fixing screw of the Gauge.
8. Scale screw and roller.

Directions for using the Saddler's Plough Gauge.

The Gauge is set to the width of the strap required by undoing the screw of the gauge, mark 7, and also scale screw and roller which is fixed by the screw on the centre of the scale. The knife when required to be sharpened is taken out by undoing the screw, mark 6; when the knife is sharpened it is fixed firmly in the body by the screw, mark 6. The elevating roller, mark 5, is set to the substance of leather required to be cut by raising or lowering the roller. The edge of the leather should be straight. The knife is then pushed steadily forward, when it will give the breadth of strap required. An expert hand would be able to cut 100 straps or pieces of any length per hour, as has been done with the accompanying knife. This knife has been in use ten years, and found to be a great saving of leather and labor. One man has often cut work sufficient to keep 30 chucklers at work daily. All parts of the Saddler's Plough with the exception of the part marked No. 2* are the improvements and additions made by Serjeant Buckley.

OPINION.—The Committee consider the improved Saddler's Plough a very effective instrument, and very creditable to the ingenuity of Serjeant Buckley of the Horse Brigade. They recommend its introduction as a very useful addition in the Leather Department at the Arsenal, and at Hoonsoor, and wherever accoutrements and saddlery &c. are prepared on a large scale.

*ion WaggonS, suggested
nance Bangalore*



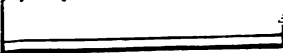
References

A. E. Alle

C, Sea

d, Thyming Ammunition Boxes.

*e, Ribs in this space, being kept down by Batten
g perforations in the wood.*

Madra  *3 feet.*

H. J. Kouwen Lithog.

Extract from Proceedings of the Military Board No. 3560 dated 22d September 1855.

DECISION.—The Instrument to be forwarded to the Grand Arsenal for trial, and one made up to be sent to the Commissary General's Department for trial and report.

(b) No. 2015 dated 29th September 1855.

Extract from a letter^(b) from the Acting Principal Commissary of Ordnance to the Secretary Military Board Fort St. George.

“ I have the honor to report that the Saddler's Plough for cutting leather, forwarded by Colonel Shirreff Commanding Horse Brigade, has been fully tried at the Arsenal, and found to be an excellent Substitute for the knife in cutting all descriptions of leather and buff straps, causing a great saving in time, labour and material.”

(c) No. 3714 dated 2nd October 1855.

The Military Board in extract from their Proceedings^(c) “ **RESOLVE** to request the principal Commissary of Ordnance to make up a Saddler's plough for each Arsenal, and to direct that the Instrument be introduced among the Allotment of Tools &c.”

ARTICLE 697.

ON AN IRON CRADLE FOR THE AXLE CASES OF AMMUNITION WAGGONS, SUGGESTED BY CAPTAIN T. H. CAMPBELL, COMMISSARY OF ORDNANCE BANGALORE. PLATE 87.

The following documents are laid before the Committee.

(a) No. 2893 dated 16th August 1855.

1. *Extract from the Proceedings of the Military Board.*^(a) Requesting that the subject be submitted to the Artillery Select Committee.

(b) No. 520 dated 22nd June 1855.

2. *Letter^(b) from the Commissary of Ordnance Bangalore to the Secretary Military Board.*

(c) No. 417 dated 18th June 1855.

Forwards Plan and Memorandum of alterations made to an Ammunition Waggon, and letter^(c) from the Officer Commanding Artillery in Mysore, reporting upon the Altered Waggon.

Extract from letter from the Officer Commanding Artillery in Mysore^(c) to the Commissary of Ordnance Bangalore.

“ On Saturday morning the altered 6 Pdr, Waggon, which
 “ you sent in, underwent a very fair trial, the full comple-
 “ ment of Ammunition Stores and Carbines were stowed in
 “ the Waggon.”

“ The Waggon was taken across country and over broken
 “ ground, also across two or three nullahs, and stood the
 “ jolting remarkably well, at all the three paces, walk, trot
 “ and gallop.”

“ No damage or crack of any kind appeared, the iron work
 “ and screws also appeared firm as at first.”

“ I approve of the alterations you have made, and would
 “ strongly recommend all the Waggons to be similarly built
 “ in future ; your Memo. of alterations and model of Cradle
 “ are herewith returned.”

Memorandum of Alterations to Waggon.

Removed six bolts and four 3 inch wood screws from the
 two bars forming side frame,—reduced bars of side frame from
 $3\frac{1}{2}$ to $2\frac{1}{2}$ inches,—Axletree bands replaced by a cradle as per
 model, to secure Iron plate ($3 \times \frac{1}{2}$ inch thick) placed over
 the Axletree bed, centre batten secured by ears welded to
 cradle, thereby preventing the necessity of perforating the
 side frame with screws at its weakest part.

Weight of Iron plates.....	lbs.	41—9
„ „ 2 Cradles.....	„	20—9

Total... „ 61—9

Reduction in weight of wood frame	lbs.	11—4
„ by removal of Axletree bands „	„	7—11
„ „ „ „ Bolts & screws „	„	3—4 22 3

Difference shewing alteration in weight—Increase lbs. 39 6

There would have been a similar increase in weight had the
 alterations been made as suggested by the Commandant of

Artillery and Major Maitland, in their letters of 21st April, and 1st May 1855—Nos. 284, and 173.

(d) No. 590 dated 14th August 1855.

3. *Letter^(d) from the Superintendent of the Gun Carriage Manufactory to the Secretary Military Board*, of which the following is an extract.

“ I submit a few observations on the accompanying model of the iron cradle for the axle case of waggon suggested by the Commissary of Ordnance Bangalore,* and ordered to be made up in Extract from the Board’s Proceedings No. 1866, dated 5th July 1855.”

* In his letter No. 520 dated 22nd June 1855, herewith returned with the other papers connected with it.

“ 2. The iron work of this cradle, is a complicated piece of workmanship, which I am not sure an ordinary Regimental Artificer could make or repair.”

“ 3. It appears to me doubtful whether four small rivets will give sufficient strength to attach the axle case to the frame, although the clamp connected to it is bolted to the bottom that separates the boxes on the Waggon.

“ 4. I don’t approve of the wood being cut away underneath the side frame, thereby doing away with the housing.”

“ 5. I consider the present way of fitting up the axle case and side frames on the waggon superior to the cradle, the side bands being lengthened in rear to meet the plates for the Carbine box, and both together being bolted to the side frame, and also to lengthen out the side bands to the end of the side frame in front.”

“ 6. I am therefore of opinion that Captain Campbell’s suggestion may stand, but it involves more labor, and after all will not be so strong as the established pattern waggon, if the iron plates now under the side frames be extended the whole length.

OPINION.—The Committee after careful examination of the proposed cradle, consider that in point of simplicity of construction and promise of efficiency, the prolongation of all

the axletree bands the whole length of the framing would be preferable, and recommend that one be constructed for trial accordingly.

Extract from Proceedings of the Military Board No. 3548 dated 21st September 1855.

DECISION.—The Superintendent Gun Carriage Manufactory to make the experimental alteration, to send it to Artillery Head Quarters for further report.

ARTICLE 698.

ON PROPOSED AXLETREES FOR 10 AND 8 INCH IRON HOWITZER CARRIAGES.

The following Documents are laid before the Committee.

(a) No. 519 dated 21st June 1855,

1. *Letter^(a) from the Commissary of Ordnance Bangalore to the Secretary Military Board.*—Describes the process of forging an axletree for an 8 inch iron Howitzer Carriage, to replace one fractured during the late Annual Practice at Bangalore, which is made from bars of flat iron 4 × 1 inch welded together by means of a temporary hammer, made from an old foreign 13 inch Shell filled with melted lead, and a rod of 1½ inch round iron fixed in the mass, this was then attached to the apparatus for bouching guns, and worked by means of two bamboo levers:—The shell when filled with lead weighed about 550 lbs. and could be worked by five or six Lascars.

(b) No. 500 dated 12th July 1855.

2. *Letter^(b) from the Superintendent Gun Carriage Manufactory to the Secretary Military Board* in which he observes, with reference to the above letter, “I hope the Axle made by the Commissary may stand, and I do not doubt it may, at the same time if it should ever be fractured, which is not impossible, I am certain there will be found the same imperfect welding between the several pieces of iron, of which it was forged, as was exhibited in the 4 inch bar which formed the fractured axle, whose place it now supplies.”

(c) No. 2121 dated 16th
July 1855.

3. *Extract from the Proceedings of the Military Board.*^(c) Forwards copies of the two foregoing letters to the Commandant of Artillery, "with a request that he will order such experiments to be made with the axle made by Captain Campbell as will test its perfect efficiency; and, if requisite, so as to break it, in order that the welding may be ascertained in contrast with that of the broken axle."

(d) No. 584 dated 9th
August 1855.

4. *Letter*^(d) *from the Officer Commanding Artillery Mysore Division to the Director Artillery Depot with Proof Report of the 8 inch iron Howitzer iron Carriage* as directed in letter from the Direc-

(e) No. 388 dated 23rd
July 1855.

tor Artillery Depôt,^(e) and reports that the carriage underwent "a severe proof, both by firing the piece at a very high elevation, (15 rounds from 10°, to 13° 15' elevation, charge 4 lbs.) and also by having the carriage taken across country over broken ground, nullahs and rocks, at a walk, trot, and gallop, and after this exceedingly severe test the axle appears perfectly sound and uninjured."

"The Carriage was severely tried for two successive mornings across country. It was well jolted over rocks and exposed to sudden shocks of great severity, for instance at a trot and gallop across narrow nullahs sufficiently shallow to admit of the horses going over without having to jump, but with banks of sufficient height and abruptness to give a very severe shock to the Chariage."

"Again, the Carriage was taken, at the same paces, over solid rocks, and brought up sharply against ledges of rock about a foot and a half in height, causing the piece to bound considerably, and the capsquares occasionally to fly off."

"The wheels and bolts suffered very much. The former are much shaken and will require to be remade, nearly all the felloes being damaged. The latter are all loosened, and the trail plate broken."

Is of opinion that it would be a pity to break the axle merely to examine into the state of the welding, which he considers to be sufficiently proved already. Suggests that the axle be further tested by firing the piece with still larger charges, and with increased elevation.

(f) Dated 29th May 1855. 5. *Letter^(f) from W. B. Wright Esquire, Locomotive Superintendent to Major T. A. Jenkins Agent of the Madras Railway Company, of which the following is a copy.*

With reference to the letter No. 26 of 2nd May, from the Secretary to the Military Board, copy of which you enclosed for my information in your letter No. 92 of 3d instant, I have the honor to state that the axles are now finished for which the 4 bars of $3\frac{1}{2}$ inch iron therein adverted to were required.

I believe that Mr. Bruce could supply you with much more satisfactory information than I can, respecting the iron referred to, as I understand he has used a considerable quantity of it for axles, and has frequently had occasion to weld pieces of it together for this purpose.

I ordered the iron in lengths to avoid the necessity of welding, and merely had the ends hammered down to admit of the fixing on of the wheels, and then had the projecting ends of the axles turned in the lathe to form bearings for the Brasses of the vehicles.

The Axles are of dimensions as per sketch in margin. (Plate 88 Fig. 1.)

The quality of this iron is excellent, but it is loose as if it had not been properly heated and worked up previous to being rolled, and it would be much improved if it could be worked over again under a steam or tilt hammer.

In welding, the iron should be heated to what is called a welding heat, which is, when the iron begins to emit vivid

When particularly sound iron is required, it is usual to take a bar thicker than the finished size, to subject each part in succession to a welding heat and to reduce it to the required size by hammering.

sparks. Great care must be taken that it is at the proper heat, as if not sufficiently heated, from the great extension and working of the iron, there is risk of separating the laminæ, which will cause the work to become unsound : whereas the hammering, if carried on at the welding temperature, would improve the soundness of the iron, and tend rather to unite than separate the fibres of the metal.

In welding two pieces of iron together, care must be taken that both are at the welding heat at the same time. The respective pieces should be withdrawn occasionally, and put into the more or less intense heat of the fire, as may be necessary, to regulate, as nearly as possible, the attainment of the requisite temperature of both extremities at the same moment.

The fire must not be so hot as to raise the outside of the iron to welding heat before the centre becomes properly heated. The mode by which I have generally seen iron welded is that technically called scarfing. It is usual to begin by thickening the ends that are to be welded by blows of the hammer to prepare it to sustain the loss it will undergo in the process of shutting up, they are then made taper as shewn persketch in the margin. (Plate 88 Fig. 2.) The two extremities are then heated, and when nearly at welding heat, a little sand is strewed over their surfaces to prevent contact with the air, which would at this heat produce oxidation and cause the surface of the metal to scale off.

When both pieces are at the proper heat the men place them quickly on the anvil, striking them first sharply across it to shake of any loose ashes that may have adhered to them.

The principal smith then leads with the small hammer, and the strikers under his direction complete the work with sledge hammers.

A single practical demonstration would however be of more service than any explanation I can give on paper, and I would suggest that Carr our European smith attend on any day that the Military Board may think proper to appoint,

for the purpose of shewing the workmen what is considered the best mode of welding.

(g) No. 410 dated 7th August 1855.

6. *Letter^(g) from the Major General Commandant of Artillery to the Secretary Military Board.*—Concurs “in the opinion and recommen-

(h) Letter No. 538 to Secretary Military Board, 27th July 1855.

“dation of Major Maitland^(h) that increased substance in the axletree is evidently required, for the 8 and 10 inch iron Howitzer Carriages, as proved by the failure of two out of three 8 inch at last Annual Practice, and the present instance of a 10 inch bending as described in sketch accompanying.”

(i) No. 2827 dated 13th August 1855.

7. *Extracts from the Proceedings of the Military Board.*⁽ⁱ⁾ Forwards copies of correspondence to the Commissary of Ordnance Bangalore, with a request that a full report may be prepared for the purpose of being laid before the Select Committee.

The Superintendent Gun Carriage Manufactory requested to furnish information with a plan and details of the proposed axletrees, with the view to the same being laid before the Select Committee.

(j) No. 3161 dated 22d August 1855.

(k) No. 598 dated 20th August 1855.

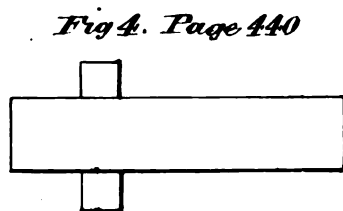
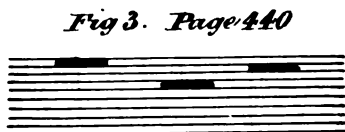
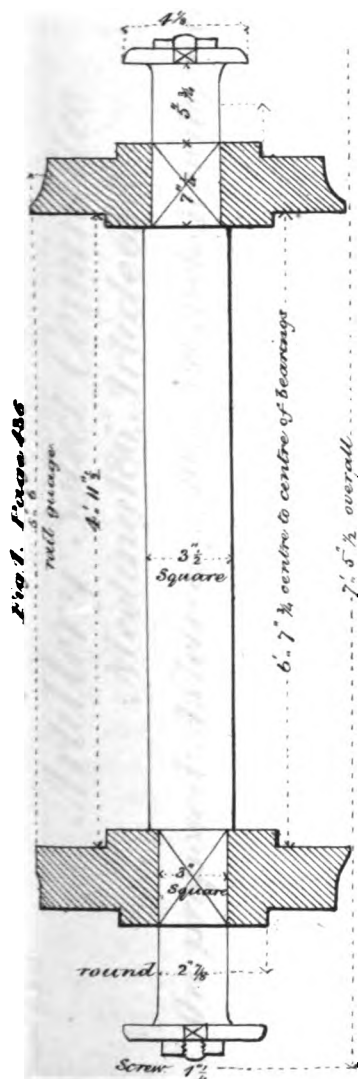
8. *Extract from the Proceedings of the Military Board.*^(j) Forwards letter from the Superintendent Gun Carriage Manufactory^(k) with a sketch (Plate 89) of the proposed axletree of larger dimensions for the 10 and 8 inch Howitzer iron Carriages, to be laid before the Artillery Select Committee.

“The Board also request that the remarks made by Government, by the Principal Commissary of Ordnance, by the Superintendent of Gun Carriage Manufactory, by the Commissary of Ordnance, by the Locomotive Superintendent, and by the Honorable Court; respecting the iron and welding, and Nasmyth’s Steam hammer, may also be considered in reference to increased weight, and size of the axletree.”

Artillery Select Committee.

Meeting 186, Article 698.

On proposed Axletrees for 10 and 8 Inch.
Howitzer Carriages

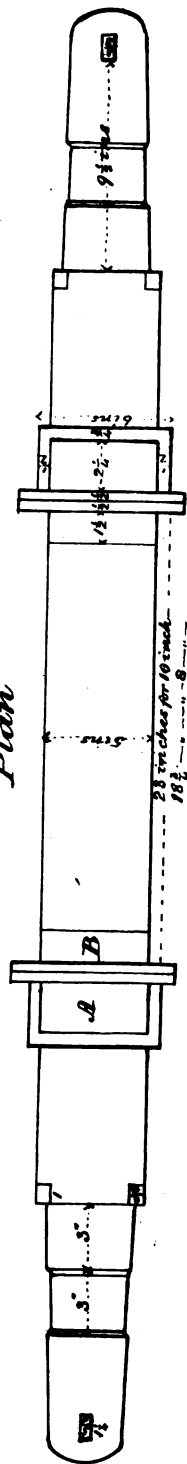


Artillery Select Committee Meeting 186, Article 698

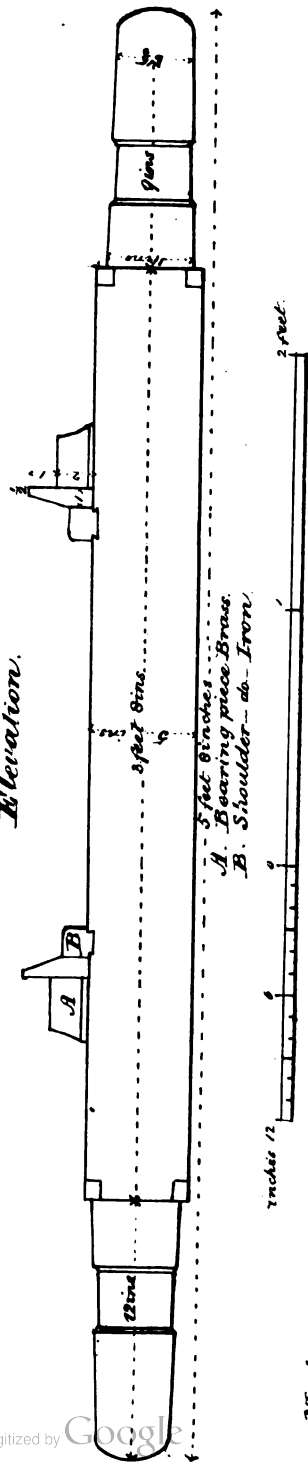
Plate 89

On proposed Axletrees for 10 and 8 Inch Howitzer Carriages.

Plan



Elevation



5 feet 8 inches
A. Bearing piece Brass.
B. Shoulder do. Iron.

12 inches 2 feet

(1) No. 733 dated 22nd
August 1855.

9. *Letter from the Commissary of Ord-
nance Bangalore to the Secretary Military*

Board. (1)

With reference to your letter of 13th Instant, No. 2827, and its enclosures, I have the honor to submit for the consideration of the Military Board and the Artillery Select Committee.

1st. That the report of the Officer Commanding Artillery in this Division, to the Director Artillery Depôt. dated 8th Instant,* contains incontrovertible proof of

*A copy of which I pre-
sume to be in possession
of the Board.

the 4 inch square welded iron axletree, without wooden case, being quite sufficient for the 8 inch iron Howitzer, provided the axletree be of good material and workmanship, without which, an axletree of twice the thickness could not be depended upon. For the 10 inch Howitzer, I think an axletree of the same dimensions would on the same conditions, prove abundantly strong, in short, after the extraordinary proof the axletree in question has undergone, I am inclined to think that no legitimate trial it can be put to will break it; It may be here well to suggest that if the Light Field axletrees were made of welded iron bar, we should not hear of their breaking as at present.

2. With reference to remark by Superintendent of Gun Carriage Manufactory "that the welded axletree would if broken shew bad welding similar to that exposed in the axletree of 4 inch square iron, broken at this station." I so far agree, that I consider it more than probable that flaws do exist in the welding; it would be wonderful if a first trial made under great disadvantages did prove *perfect*, at all events enough has been done to show that a first rate axletree can be made of iron welded together, even with the inadequate means provided in an outstation Arsenal, but having so far agreed with the above Officer, I beg to dissent from his opinion regarding the nature of the flaws that might possibly be found in the welded axletree, I do not think they could

be similar to those found in the other ; the former is composed of flat bars of iron laid one above the other (Plate 88 Fig. 3.) thus welded together and beaten out so that flaws in welding, if they exist, would have a direction *along* the axletree, and not materially injure it, whereas in the latter, pieces of iron are laid over a 4 inch square bar of iron to form shoulders, (Plate 88 Fig. 4) then welded into the bar causing flaws somewhat of this shape, (Plate 88 Fig. 5.) A glance at the sketches, where the supposed flaws are represented by thick lines, will be enough to prove how different the nature of the flaws must be, and how trifling those in the welded axletree ought to be.

3. Regarding the comparative merits of light and heavy hammers in heavy work, it appears almost useless to speak, the point being quite decided by the best authorities in England, in favor of the latter, but I would mention for consideration that in welding or working a large mass of iron, hammers of 12 or 14 lbs. weight can have little or no effect beyond the surface, and therefore a great waste of labor and material must take place with a very unsatisfactory result.

In conclusion I wish to bring particularly to notice a subject which is not touched upon in the correspondence under reply, but which appears to me even of more consequence than the comparative merits of welded and ordinary axletrees, viz. the bearing of the cheeks upon the axletree ; I have very little doubt that had there been a proper bearing upon the axletrees mentioned in Commandant of Artillery's letter, they would not have broken or bent, and I would again respectfully urge upon the notice of the Military Board my proposal forwarded in letter No. 342 of 19th April 1855 ; the Carriage that has just undergone so severe a proof is thus fitted up, and I have no doubt the bearing of 4 inches instead of 2 upon the axlétree by each cheek has been of much advantage ; the blocks of iron faced with copper inserted over the axletree have not moved in the least, and no disadvantage

of any kind appears from the alteration, though the carriage has undergone a trial that it is impossible it could ever meet with on service. The Superintendent Gun Carriage Manufactory suggests the contingency of giving up iron carriages of the present pattern, but I trust this will not be done without very serious consideration; at the present time the necessity for bringing heavy ordnance into the field is beyond a doubt, and iron howitzers with iron carriages seem to be in every way the most eligible for the purpose, and I can see no reason why our field batteries, with a better means of carrying ammunition than at present, might not be in part thus armed.

There is one thing specially worthy of remark viz. that the only parts of the 8 inch howitzer carriage seriously damaged in the late proof are the wheels, the iron work is all good and only requires a small repair to the trail plate, and the bolts being tightened, whereas the *wooden* wheels must be re-made, I do not mention this to find fault with the wheels which were most excellent, but to shew how very good the iron carriage must be to stand what destroyed them.

(m) No. 3191 dated 29th
August 1855.

10. *Extract from the Proceedings of the Military Board.*^(m) Forwards copy of the above letter for submission to the Artillery Select Committee with the other papers connected with the iron axles, and authorizes the Commissary of Ordnance at Bangalore, applying to the Officer Commanding Artillery to carry out any experiments he wishes, also authorizes the Officer Commanding Artillery to make such experiments as he may consider desirable to test the axles and iron carriages.

OPINION.—The Committee consider the result of the trial at Bangalore by Captain Campbell exceedingly satisfactory, and when the complete Machinery is received necessary to bring into operation the Steam Hammers already arrived, the welding of iron for 4 inch Axletrees, may be satisfactorily undertaken, meanwhile they recommend, for the repair and

construction of necessary carriages, that 5 inch iron axles, as formerly in use be reverted to, as likely to prove a safe expedient.

(n) No. 3765 dated 4th
October 1855.

DECISION.—Additional thickness for the axletrees sanctioned. *Extract from Proceedings of the Military Board.*⁽ⁿ⁾

(o) No. 3949 dated 17th
October 1855.

The Military Board in Extract from their Proceedings,^(o) direct that the subject of increasing the size of the axletree be reconsidered.

ARTICLE 699.

AMMUNITION BOXES OF VARIOUS KINDS OF WOOD AND DIFFERENT THICKNESS.

The undermentioned Documents are laid before the Committee.

(a) No. 2829 dated 13th
August 1855.

1. *Extract from the Proceedings of the Military Board.*^(a) Directs Ammunition Boxes of various kinds of wood and different thickness to be made up and submitted to the Artillery Select Committee for their opinion.

(b) No. 227 dated 14th
May 1853.

2. *Letter*^(b) *from the Superintendent Gun Carriage Manufactory to the Secretary Military Board.*

(c) No. 454 dated 25th
August 1853.

3. *Letter*^(c) *from do. to do.*

(d) No. 524 dated 1st
October 1853.

4. *Do.*^(d) *from do. to do.*

(e) No. 586 dated 4th
November 1853.

5. *Do.*^(e) *from do. to do.*

(f) No. 426 dated 19th
November 1853.

6. *Do.*^(f) *from the Commt. of Arty. to do.*

(g) No. 630 dated 5th
December 1853.

7. *Do.*^(g) *from the Superintendent Gun Carriage Manufactory to do.*

(A) No. 256 dated 27th June 1855. 8. *Letter^(h) from the Commandant of Artillery to the Secretary Military Board.*

(c) No. 573 dated 9th August 1855. 9 *Do.⁽ⁱ⁾ from the Superintendent Gun Carriage Manufactory to do.*

The undermentioned Ammunition Boxes are also laid before the Committee.

Without Iron Works.

- 1 Box Ammunition Limber Gun 9 Pdr. of
Deal wood with $\frac{7}{8}$ inch throughout.....weighing 30 lbs.
- 1 Box Ammunition Limber Gun 9 Pdr. of
Teak wood with 1 inch throughout.....weighing 56 lbs.
- 1 Box Ammunition Limber Gun 9 Pdr. of
Teak wood with top and front sides 1
inch, the bottom, ends and rear sides
 $\frac{3}{4}$ inch.....weighing 45 lbs.

OPINION.—The Committee having examined the boxes and duly weighed the reports on the trials with the Deal wood boxes, and the objections found to attend their use in this Country, consider Teak the most desirable for service in India, and approve of that one having lids and fronts of 1 inch, and the remainder of $\frac{3}{4}$ inch thickness, which they recommend for future adoption.

ARTICLE 700.

ON THE PERMANENT EXPANSION OF SHOT AND SHELLS AFTER REPEATED HEATING.

The following Documents are laid before the Committee.

(a) No. 1690 dated 17th August 1855. 1. *Letter^(a) from the Acting Principal Commissary of Ordnance to the Secretary Military Board.*—Forwards memorandum of experiments carried on with six 24 pounder unserviceable Shells, with a view of ascertaining whether they would permanently expand by repeated heating.

Experiments with 6-24 Pdr. Unserviceable Shells to test whether they will permanently expand by repeated heating.

Diameter of six shells after being cleaned and before being heated.	Diameter of the same six shells after the first heating.	Diameter of the same six shells after the second heating.	Diameter of the same six shells after the third heating.	Expansion.	REMARKS.
1st Shell 5·52	5·54	5·54	5·56	·04	These Shells were covered with crucible clay and heated in an Annealing Furnace; after cooling they were cleaned & gauged and then recovered with clay and heated; they were cleaned and gauged after each heating.
2nd „ 5·50	5·53	5·54	5·54	·04	
3rd „ 5·49	5·53	5·55	5·56	·07	
4th „ 5·52	5·52	5·54	5·54	·02	
5th „ 5·50	5·52	5·54	5·55	·05	
6th „ 5·52	5·55	5·55	5·55	·03	

ARSENAL,
FORT ST. GEORGE, }
17th August 1855.

(Signed.) P. HAMOND, Lieut. Col.
Acting Principal Commissary
of Ordnance.

(b) No. 2995 dated 20th
August 1855.

2. *Extract from the Proceedings of the Military Board.* (b) Resolved to forward the above Report to the Major General Commandant of Artillery with a request that he will bring the question under the consideration of the Artillery Select Committee.

The Board observe that all the shells experimented on were not only below the low gauge 5·584 inch but even below the unserviceable gauge 5·54 inch of the Table in Board's Circular Order No. V. of 18th April 1845, whereas by the Annealing process they have all been raised to above the unserviceable gauge.

The Board will request the Principal Commissary of Ordnance to continue the experiments not only with Shells, but with Shot, and in addition to gauging, to weigh and gauge the projectiles both before and after each annealing, also to test the projectiles by breaking with hammers, throwing them from a great height &c.

The experiment is of very considerable interest, as the largest portion of our projectiles will be found of very low gauge.

The Board observe that Lefroy in his *Hand Book* points out the expansion of projectiles by heating, but the peculiarity of the Principal Commissary of Ordnance's experiment consists in the Shells expanding the second and third time of heating.

The state of the projectiles before and after heating, viz. whether rough or smooth, also their sphericity, and the centre of gravity, if possible, should be noted down, and new and old projectiles experimented on.

OPINION.—The Committee defer the consideration of this subject until the experiments still in progress are completed, and full information of the results is before them.

ARTICLE 701.

ON THE EXPEDIENCY OF AMENDING THE ALLOTMENT OF AMMUNITION CARRIED WITH LIGHT FIELD BATTERIES.

The following Documents are laid before the Committee.

(a) No. 2357 dated 23d July 1855. 1. *Letter^(a) from the Secretary Military Board to the Major General Commandant of Artillery*, of which the following para. 6 has reference to the subject in question.

“6. The Board would also request your reconsideration
 “to the grave fact of the Madras Batteries carrying a greater
 “quantity of Ammunition than the Bengal and Bombay
 “Batteries; a Bengal 9 Pdr. Battery of five 9 Pdrs. carries
 “480 rounds of Round, Canister and Case Shot, but a Madras
 “Battery of four 9 Pdrs. carries 496 rounds, the Bengal
 “being in the proportion of 96 rounds per piece, and the
 “Madras Battery 124 rounds per piece, and as neither our
 “Horses or Bullocks are superior to those of Bengal, nor the
 “allotment more favorable, perhaps a re-consideration of the
 “rounds may be made.”

(b) No. 416 dated 10th August 1855. 2. *Letter^(b) from the Major General Commandant of Artillery to the Secretary*

Military Board, in para 2 of which he suggests the subject being submitted to the Artillery Select Committee.

“ 2. In para 6 of your letter, the Board suggest the expediency of reducing the allotment of Ammunition carried with our Light Field Batteries to a level with that of Bengal. Our allotment has been, I beg to observe, maintained, and valued, as a superiority in our equipments which it would be deemed a decided retrogression and disadvantage, by the Regiment, now to abandon. By the annexed state-

* See Page 450.

ment,* it will be observed, that while our equipments exceed those of Bengal, and (except the 24 and 9 Pdrs.) the Bombay also, we are surpassed by the Royal allotments : and in the distribution of the several kinds of ammunition, the Royal is, I conceive, very superior to our own ; the proportions between Round shot, Spherical Case Shot and Canister, being far more judicious than ours. While therefore I decidedly deprecate any reduction in quantity, I am prepared as decidedly to advocate an improved allotment of kinds of ammunition, and, on the whole, am inclined to prefer that of the Royal Artillery to any ; and as our Boxes are found to contain this easily, except the 24 Pdrs. which require the removal of the partitions, to admit of their doing so, I should suggest the subject being submitted for the consideration of the Artillery Select Committee.”

(c) No. 3084 dated 21st August 1855.

3. *Letter^(c) from the Secretary Military Board to the Major General Commandant of Artillery.*—Directing the question being laid before the Artillery Select Committee.

OPINION.—The Committee having duly considered and compared the allotments of the Royal Artillery, as well as those of the Artilleries of the three Presidencies, concur in the opinion and recommendation of the Major General Commandant of Artillery that a diminution of our allotment is not desirable, but that those of the Royal Artillery, which

are easily stowed in our boxes, without any other alteration than the removal of the cross partition of the 24 Pdr. Howr. Boxes, may be very advantageously substituted for our present allotment, as nearly as equalization of kinds of ammunition in our boxes will admit. Revised Tables are herewith accordingly forwarded, and the necessary instructions recommended to be furnished to the Superintendent Gun Carriage Manufactory, for his guidance, in event of the alteration being sanctioned.

Revised Tables of Ammunition for Light Field Batteries, prepared according to the Royal Allotment as nearly as equalization of kinds of Ammunition in each Box will admit; proposed to be substituted for the present Madras Allotment.

TO A HORSE ARTILLERY BATTERY.

6 Pdr. Gun.

24 Rounds in each Ammunition box.

2 Canister in the Axletree boxes,

Total for one Subdivision..... rounds. 194

Spare Cartridges..... 14

Cartridge of priming powder in each Ammunition box.... 1

12 Pdr. Howitzer.

17 Rounds in each Ammunition box.

None in the Axletree boxes.

Total for one Subdivision..... rounds. 136

Spare Cartridges..... 8

Cartridge of priming powder in each Ammunition box.... 1

TO A FOOT ARTILLERY BATTERY.

9 Pdr. Gun.

16 Rounds in each Ammunition box.

None in the Axletree boxes.

Total for one Subdivision..... rounds. 128

Spare Cartridges..... 16

Cartridge of priming powder in each Ammunition box... 1

24 Pdr. Howitzer.

10 Rounds in each Ammunition box.

2 Canister in the Axletree boxes.

Total for one Subdivision..... rounds. 82

Spare Cartridges..... 6

Cartridge of priming powder in each Ammunition box... 1

	6 Pdr. Gun.	12 Pdr. Howitzer.	9 Pdr. Gun.	24 Pdr. Howitzer.
Shells common	0	*	0	*
Shot round	18	0	11	0
„ Spherical Case	4	8	3	5
„ Canister	2	1	2	1
Total...	24	17	16	10
Cartridges filled	26	18	18	11
	(a)			
„ Priming	1	1	1	1
Total number of extra Cartridges...	14	8	16	6

* In the rear Boxes of the 12 Pdr. Waggon 4 Carcasses are carried in lieu of the same number of Shells, and in the rear boxes of the 24 Pdr. Waggon 2 Carcasses in lieu of the same number of Shells.

(a) One in each Box, except the rear box of Gun limber which carries a priming pouch.

The Priming powder allotted for the rear box of the Gun limber is carried in the priming pouch instead of a cartridge.

In the small store boxes on the Carriage Axle.

24 Pdr. Howitzer...Right box to carry two Canisters.

6 Pdr. Gun.....Right box to carry two Canisters.

Allotment of Ammunition proposed by the Permanent Artillery Select Committee, in Meeting 186, Article 701, dated 3rd September 1855.

		Howitzers.		Guns.	
		24	12	9	6
For each piece of Ordnance with one Waggon.	Shot round.....	0	0	88	144
	„ Spherical Case.....	40	64	24	32
	„ Canister.....	10	8	16	18
	Shells Common.....	30	60	0	0
	Carcasses.....	2	4	0	0
Total...		82	136	128	194

Average weight of the above Allotment stowed in the Ammunition box, the weight of powder for charges being included in that of the Shot.

		24 Pounder Howitzer.			12 Pounder Howitzer.			9 Pounder Gun.			6 Pounder Gun.		
		Weight.			Weight.			Weight.			Weight.		
		No.	lbs.	oss.	No.	lbs.	oss.	No.	lbs.	oss.	No.	lbs.	oss.
* The rear Boxes of 24 Pdr. Howr. Waggon carry 2 Carcasses instead of 3 Shells, and those of the 12 Pdr. Howr. Waggon 4 Carcasses instead of 4 Shells.	Shot round.....	0	0	0	0	0	0	11	124	5	18	134	154
	„ Spherical case	5	117	8	8	95	11	3	30	7	4	26	15
	„ Canister.....	1	17	12½	1	11	5	2	26	½	2	17	2
	Shells Common ...	4	77	1	8	77	5½	0	0	0	0	0	0
	Carcasses.....	*	0	0	*	0	0	0	0	0	0	0	0
Total...		10	212	5½	17	184	5½	16	160	12½	24	179	181

ARTILLERY DEPÔT,
SAINT THOMAS' MOUNT, } (Sd.) G. ROWLANDSON, Major,
3rd September 1855. } Acting Director Artillery Depôt.

*Statement shewing the number of rounds of Ammunition carried with one Subdivision in the Royal,
Bengal, Madras and Bombay Artilleries.*

	Round Shot.		Spherical Case.		Canister.		Shell's		Car- tridges		Total.		REMARKS.					
	Guns.		Guns.		Guns.		Howrs.		Howrs.		Guns.							
	9	6	24	12	9	6	24	12	24	12	24	12		9	6			
	*85			*24														
Royal.....	92	149	42	68	20	26	8	8	16	19	32	56	2	484	136	128	194	Royal.—British Gunner* of 1854—Leftroy of 1854—Fd. By. Exercise 1853.
Bengal.....	72	96	32	38	16	16	8	8	16	22	32	2	2	261	80	96	128	Bengal—Artillery Tables.
Madras.....	66	98	32	56	24	32	10	36	34	67	22	38	2	266	132	124	197	Madras.—Arty. Sel. Com. Meeting 152 Art. 513-16 Nov. 1848—Gunners Assistant.
Bombay.....	91	91	30	30	24	24	15	15	19	19	27	27	3	375	75	134	134	Bombay—Arty. Sel. Com. Proceedings Vol. II.
Madras.....	88	144	40	64	24	32	10	8	16	18	30	60	2	482	136	128	194	Madras.—Arty. Sel. Com. Meeting 186, Art. 701, 3rd September 1855.

ARTILLERY DEPOT,
SAINT THOMAS' MOUNT,
3rd September 1855.

Signed.) G. ROWLANDSON, Major,
Acting Director Artillery Depot.

ARTICLE 702.

ON A CAST IRON PORTFIRE MOULD WHICH THE LATE BENGAL MILITARY BOARD PROPOSED TO BE SUBSTITUTED FOR THAT OF GUN METAL AT PRESENT IN USE.

The following Documents are laid before the Committee.

(a) No. 5126, dated 24th August 1853.

1. *Extract from the Proceedings of the Military Board*^(a)—Forwards the following correspondence and states that the Military Board are prepared to furnish any information required.

(b) No. 861 dated 28th July 1854.

2. *Letter*^(b) *from the Officiating Secretary to the Government of India in the Military Department Fort William to the Secretary to Government Military Department Fort Saint George.*—Transmits correspondence relative to the subject of a cast iron portfire mould proposed to be substituted for that of gun metal at present in use, and requests that under the orders of His Lordship in Council, the Permanent Select Committee of Artillery Officers at Fort St. George may be called upon for a report on the subject.

(c) No. 81 dated 23rd June 1855.

3. *Letter*^(c) *from the Permanent Select Committee of Artillery Officers to the Officiating Secretary to the Government of India in the Military Department.*—Reports their having caused the cast iron mould to be brought into use in the Artillery Depôt of Instruction to test its merits: forwards plans of the old and new moulds, together with the Director's Report, in which they entirely concur and recommend the new mould being adopted with the alterations suggested by him.

Report of Major C. Hogg, Director Artillery Depot dated 8th June 1855.—Considers this pattern much superior to the one at present in use. The brass rings in the old pattern mould require much force both in closing and opening it, many mallets are destroyed and a great deal of time lost in the operation. The screw clamps in the new mould are easily put on and quickly fitted and bring the two halves of

the mould closer together. The plan of screwing one of the half cylinders to the shoe is also a good one.

Decidedly objects to the material of which it is made "cast iron," which he considers not only dangerous but inferior even as a material, and more expensive than the old one.

Believes nothing is gained by the substitution of cast iron for brass.

The cost of the materials are for the brass mould...	47	15	0
Of the cast iron one.....	9	7	0
	<hr/>		
	Difference...	38	0 0
	<hr/>		

" Captain Brown states that the cost of the workmanship " is rather more for the iron mould than the brass one, and " it must be borne in mind, that the material of the brass " mould when worn out is worth nearly as much as the old " gun metal is when new, whilst that of the cast iron one is " valueless."

Recommends " that the body of the mould viz. 2 half " cylinders, cup and shoe be constructed as hitherto of Gun- " metal and the clamps of wrought iron, leaving the holes in " the head of the screws sufficiently large to receive the " bottom pin which can then be used in screwing up the " mould and prevent a separate instrument being required."

Objects to the form of the cup and shoe being altered, the latter in the new pattern is so small that the mould is very unsteady.

(d) No. 2363 dated
18th August 1855

Letter^(d) from the Inspector General of Ordnance to the Officiating Secretary to the Government of India Military Department,—of which the following is an extract.

" 2. I agree in opinion with the Committee that the pat- " tern of the proposed mould may (with the exceptions which " they notice) be adopted, but that the material used for all

“ the parts excepting only the clamps, should be of gun metal as at present.”

“ 3. The clamps must be made of wrought iron.”

“ 4. The advantages, in point of economy, that would attend the use of Cast iron instead of Gun metal, have been greatly over rated, as the Superintendent of the Foundry clearly showed in the letter that accompanied his valuation statement.”

“ 5. The high price set upon the mould of gun metal, and the low price attached to that of cast iron, were obtained by putting general and machinery expences upon each article according to the value of the raw material employed, so that the brass mould which was more easily cast and finished, and at the smallest amount of injury to the tools, was made to bear a most unfair proportion of the burthen.”

OPINION.—The Committee entirely concur in the opinion and recommendation of the Permanent Select Committee of the Bengal Artillery as to the proposed improvements of the present Portfire Mould ; and recommend that one of the improved moulds be furnished to this Presidency for guidance.

(a) No. 158 dated 1st October 1855.

DECISION.—The Report of the Permanent Artillery Select Committee laid before Government, *vide*, Letter^(a) from the Military Board to the Secretary to Government Military Department.

MEETING 187.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF MAJOR GENERAL F. BLUNDELL, C. B., COMMANDANT OF ARTILLERY.

Artillery Depot Saint Thomas' Mount 5th November 1855.

PRESENT.

COLONEL P. HAMOND, *Acting Principal Commissary of Ordnance.*
 COLONEL G. ALCOCK, *Commanding 2nd Battalion Artillery.*
 LIEUT. COL. P. J. BEGBIE, *Commanding 5th Battalion Artillery.*
 LIEUT. COL. P. ANSTRUTHER, C. B., *Supt. Gun Powder Manufactory.*
 MAJOR G. W. Y. SIMPSON, *Director Artillery Depot.*
 MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*
 LIEUTENANT R. MORTON, *Adjutant 2nd Battalion Artillery.*

ARTICLE 703.

PROPOSITION FOR A MOVEABLE KIND OF SEAT FOR THE MEN WHO RIDE ON THE LIMBERS OF LIGHT FIELD CARRIAGES, BY MAJOR G. ROWLANDSON H. A.

The following Documents are laid before the Committee.

(a) No. 472 dated 18th September 1855. 1. *Letter^(a) from Major G. Rowlandson H. A. to the Major General Commandant*

of Artillery.—Recommends that the deficiency of some suitable seat for the men who ride on the Limber at Exercise in the Horse Artillery, and those who ride on the Limber and Waggon boxes, in the Horse Batteries be brought under the consideration of the Military Board, and observes that :—

“ In the Royal Artillery, provision is made for the necessity, by the folding of blankets strapped down ; and some such arrangement of a *moveable* kind is unquestionably preferable to a stuffed fixed cushion, which is liable to many objections ; especially, that of frequent soaking during rains in camp, which would rot the wood underneath, and saturate the men's clothes sitting upon them, thereby exposing them to chills, rheumatism &c. ; whereas, blankets or cumblies, or prepared numdas, would be kept dry in the harness tents, and prove useful for covering, or as pillows at night.”

(b) No. 478 dated 20th
September 1855.

2. *Letter^(b) from the Major General Commandant of Artillery to the Secretary Military Board.*—Forwards the above letter in which suggestion he entirely approves, and requests that the subject may be submitted to the Permanent Artillery Select Committee.

(c) No. 3574 dated 25th
September 1855.

3. *Extract from the Proceedings of the Military Board.*^(c)—Requests that the question be brought under the consideration of the Artillery Select Committee, and that, “It appears requisite to ascertain the practice at the other Presidencies, also, as to the method of providing the Blanket or Cumbly.”

OPINION.—The Committee recommend that their decision on this subject be deferred until the practice obtaining, in this respect, at the other Presidencies can be ascertained.

Extract from the proceedings of the Military Board No. 4404 dated 19th November 1855.

DECISION.—“The Board authorize the above question to be deferred, pending further information which they are prepared to obtain on the application of the Major General Commandant of Artillery.”

ARTICLE 704.

ON AN IMPROVED PATTERN “VICE HAND FUZE WOODEN”
MADE BY STORE SERJEANT CRAWLEY ATTACHED TO THE
ARSENAL OF FORT ST. GEORGE. (PLATE 90.)

The undermentioned Documents are laid before the Committee.

(a) No. 3767 dated 6th
October 1855.

1. *Letter^(a) from the Acting Principal Commissary of Ordnance to the Secretary Military Board.*—Submits an improved pattern “Vice hand fuze wooden,” made up by Store Serjeant Crawley ;—“with which any Fuze for Light Field Ordnance can be secured

“ without injury to the capping, the interior of the part into which the head of the Fuze is inserted being enlarged inwardly.”

“ The improved pattern vice has also been fitted up with a spring which causes it to open out as required, when unscrewed to receive the head of the Fuze.”

[b] No. 3767 dated 6th October 1855.

2. *Extract from the Proceedings of the Military Board.*^[b]—Forwards the above letter and requests “ that the Artillery Select Committee may report on it at an early date, as the Instrument appears likely to be as useful as it is creditable to Serjeant Crawley.”

OPINION.—The Committee are of opinion that the Hand Fuze implement submitted for consideration is a decided improvement on that now in use, and they therefore recommend its adoption.

2. The Committee recognize Serjeant Crawley's praiseworthy efforts in effecting this improvement.

Extract from the proceedings of the Military Board No. 4411 dated 19th November 1855.

DECISION.—The Hand vice proposed by Serjeant Crawley approved of, and its introduction into the Artillery Service authorized.

The Principal Commissary of Ordnance requested to prepare a supply for distribution to out Station Arsenals.

ARTICLE 705.

ON PROPOSED AXLETREES FOR 10 AND 8 INCH IRON HOWITZER CARRIAGES.

* Extract from proceedings No. 3949 dated 17th October 1855.

The Military Board direct* the subject being submitted for the reconsideration of the decision of the Select Committee in Meeting 186 Article 698, of 3rd September 1855, with reference to increasing the size of the Axletree.

The correspondence which was before the Committee at their Meeting above referred to, is again laid before them, with the addition of the undermentioned Documents.

[a] No. 867 dated 6th October 1855.

1. *Letter^[a] from the Commissary of Ordnance Bangalore to the Secretary Military Board.*

[b] *Letter from Commissary of Ordnance Bangalore to the Officer Commanding Artillery Mysore, No. 774 dated 6th September 1855.*—Suggesting experiments being made in firing the 8 inch Howr. with increased charges and higher elevations.

Letter from the Officer Commanding Artillery Mysore Division to the Commissary of Ordnance Bangalore No. 745 dated 3rd October 1855.—Forwards Proof report of the 8 inch Howr. Carriage (5 rounds at 15°, 5 at 18° and 5 at 20°, charge 5 lbs.) and states that he has "no hesitation in pronouncing the axle to be an exceedingly strong one and capable of sustaining a much severer shock than in all probability would ever take place on the line of march or on actual Service."

Submits copy of correspondence^[b] and report of proof, with reference to Extract of proceedings of Military Board dated 29th August 1855, and states that on the 8 inch Howitzer Carriage

being returned into the Arsenal, he caused it to be taken to pieces and each portion minutely examined, with the following results:—

1. "Small injury in trail plate, as previously reported increased, but not important."

2. Metal covering of the semelle slightly loosened, and considerably indented where the breech of the piece touches it.

3. "The wheels, as before mentioned, much shaken, the Carriage has no other injury of any description, the axle-tree is in the best order, and the blocks of iron faced with copper inserted between the cheek and axletree are quite uninjured."

[c] No. 891 dated 12th October 1855.

2. *Letter^[c] from the Commissary of Ordnance Bangalore to the Secretary Military Board.*—Submits remarks on Extract of Proceedings of the Military Board,^[d] sanctioning increased thickness in axletree of 8 and 10 inch iron Howitzer Carriages, and proceedings of Permanent Artillery Select Committee.

[d] No. 3765 dated 4th October 1855

It appears unadvisable to increase the thickness of axletree; because it cannot be done without cutting out the cheeks so as to weaken them very materially, and, that unless new wheels are made for the Carriages now in use the advantage of increased thickness is lost, as the 5 inch axle must have its arms reduced to the same size as those of the 4 inch: is of opinion that the risk of flaws will be increased to such a degree, as to counterbalance the advantage gained in increase of thickness.

Is convinced, that, though the quality of the axletree is of great importance, the bearing of the cheeks upon it is still greater, and that the alteration made by him therein, has very materially assisted in preventing damage being done, and most probably a carriage fitted up in this way with an *unwrought* 4 inch axletree such as now in use would stand any ordinary proof—suggests that the 8 inch Carriage lately sent to Bangalore should be thus fitted up with its present axletree, and it, as well as the one with the welded axletree, be given over to the Officer Commanding Artillery in Mysore for the approaching Annual Practice, to be there tested in a manner that may satisfactorily decide the point in question.

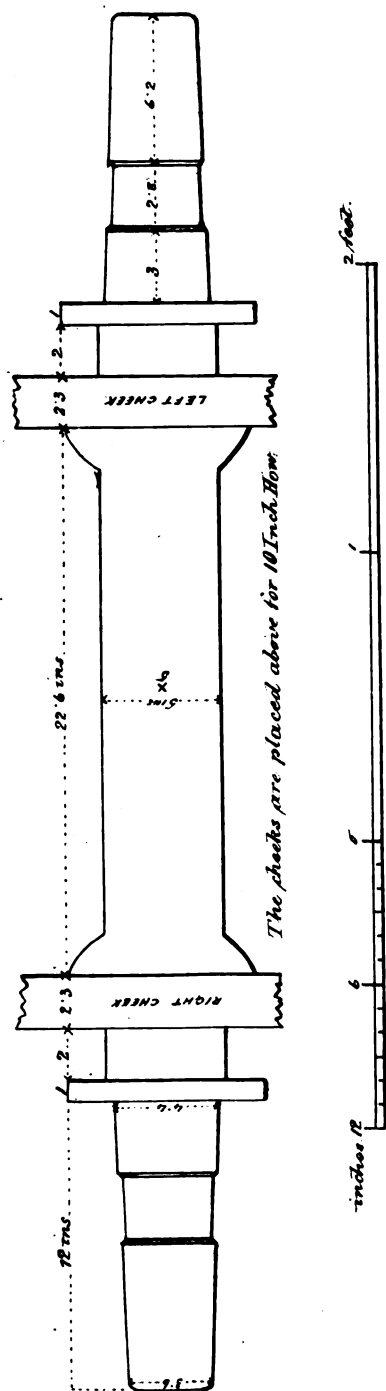
Remarks that no necessity exists for waiting till the Steam hammers arrived from England can be brought into use, as he found no difficulty in working a hammer of 350 lbs. which is sufficiently heavy for the manufacture of Axletrees 4 inch square.

[e] No. 4049 dated 27th October 1855.

3. *Extract from the Proceedings of the Military Board.*^[e]—Forwards a Tabular Statement of the weight and dimensions of the proposed axletree for 8 and 10 inch Howitzer iron Carriages, and the axletree at present in use, with the Board's opinion "that
" this accumulation of weight of 137 lbs. extra, to an already
" very heavy carriage, merely on the plea of Iron not being
" welded, appears very questionable."

Artillery Select Committee Meeting 187 Article 705.

Sketch shewing original dimensions of Iron Arletrees for
10 and 8 Inch How^r Carr^s: recommended to be reverted to.



Tabular statement of the weight and dimensions of the proposed Axletree for 10 and 8 Inch Howitzer Iron Carriage, and the Axletree at present in use.

	Body.			Arm.				Weight.
	Length.	Breadth.	Depth.	Length.	Diameter at shoulder.	Diameter at the end of Nave.	Distance from the shoulder to the end of Nave.	
Proposed Axletree.....	Ins. 44	Ins. 5	Ins. 5	Ins. 12	Ins. 4½	Ins. 4½	Ins. 8½	lbs. 397
Axletree at present in use.	44	4	4	12	4	3½	8½	260

GUN CARRIAGE MANUFACTORY

(Sigd.) J. MAITLAND, Major,

MADRAS, 24th October 1855.

Superintendent Gun Carriage Manufactory.

[f] No. 914 dated 24th October 1855.

4. *Letter^[f] from the Commissary of Ordnance at Bangalore to the Secretary Military Board.*—Notifies his having despatched to the Grand Arsenal a piece of iron cut from the axletree lately welded from bars of 4 × 1 Inch, and suggests that it may be sent to the Artillery Select Committee.

[g] No. 4128 dated 30th October 1855.

5. *Extract from the Proceedings of the Military Board.^[g]*—Forwards copy of the above letter for submission to the Artillery Select Committee; and requests that the Principal Commissary of Ordnance will send the iron to Artillery Head Quarters.

OPINION.—The Committee consider it advisable to enter on this subject in its entire bearing, that is, not only with reference to the dimensions of Axles, and the question of welding, but also as to the best length of axle; a question which several years experience now enables the Committee better to determine.

1. With regard to these joint considerations (length and breadth of Axle) the Committee after a careful review, recommend that the original dimensions,* and original length, of Axles for the 10 and 8 Inch Iron Howitzer Carriages, be reverted to.

* Vide Drawing attached [Plate 91.]

2. The Committee further recommend that both the Carriages alluded to in the Principal Commissary of Ordnance's letter be forwarded to the Gun Carriage Manufactory, in order that the Superintendent may fit them with Axles of the construction specified above; and further that on the completion of the same, both carriages be sent to Saint Thomas' Mount for experimental Proof.

3. Referring to Captain Campbell's remark, that the cheeks of the Carriages will be weakened and injured by housing into 5 inch Axles, the Committee observe that all the first Iron Carriages, for both the 10 and 8 inch Howitzers, were constructed with Axles of those dimensions, and that the cheeks of these Carriages (of the same dimensions as at present) bore both firing and the line of march, uninjured.

4. The Committee may here mention that Captain Campbell's suggestion, regarding the introduction of brass bearing points, between the cheeks and axle, has been adopted.

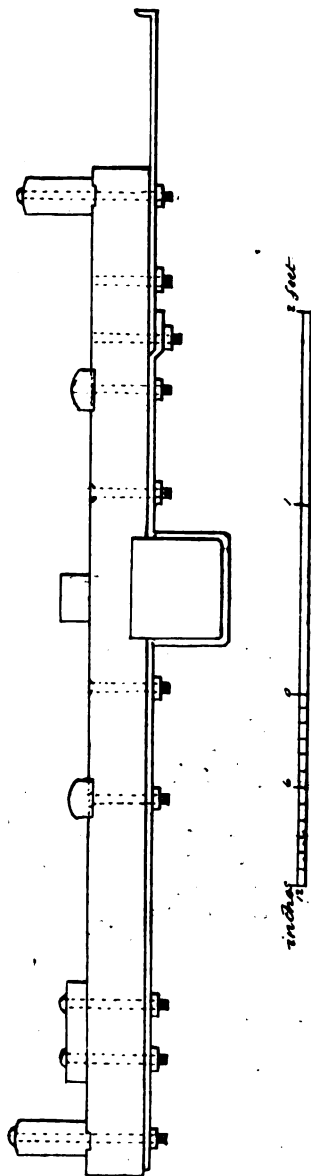
5. The Committee are perfectly aware that the Axles now fitted to Carriages are not of "*wrought iron*," in the accurate acceptation of that term, the iron in question being that designated "*rolled Bar Iron*," which is worked up in the Gun Carriage Manufactory as received from England. The Committee recognize the imperative necessity of thoroughly welding and hammering all Iron intended for Axles, which process, as soon as the Nasmyth's Hammer now at the Gun Carriage Manufactory is in working order, the Superintendent will effectually carry out, by which means greater density, and consequently greater strength in a smaller compass, will be obtained.

[h] No. 4397 dated 19th
November 1855.

DECISION.—The Board in Extract from their proceedings^[h] approve of the Committee's suggestions to revert to the breadth of axle and thickness as previously established, but request attention to the great importance of adjusting the height of the piece

*Artillery Select Committee
Meeting 187 Article 706*

On lengthening the Axle Bands of Ammunition Waggon



Matras Artillery Depot

BRILLIANT

above the ground, so as to adapt it to the space covered by the wheels and axle, and request the Superintendent Gun Carriage Manufactory to explain the details of construction of the former carriages, and those now proposed to be prepared; in the mean time authorizing the construction of an experimental Carriage.

The Board highly approve of the remarks of the Select Committee respecting the welding of the iron supplied from England, and as Government, by their Resolution as per

margin, have called the Board's attention to this important point, it is to be hoped that the welding will be carefully attended to.

The Board notice with satisfaction the successful experiment made by Captain Campbell at Bangalore to supply the means of welding iron, and consider the hammer used for the occasion a useful application of power in the Field, where no Steam hammer can be obtained to weld a broken Axle.

ARTICLE 706.

ON LENGTHENING THE AXLE BANDS OF AMMUNITION WAGGONS. (PLATE 92.)

The following Documents are laid before the Committee.

[a] No. 742 dated 20th October 1855.

1. *Letter^[a] from the Superintendent Gun Carriage Manufactory, to the Secretary Military Board.*—Requests to know “whether the Axletree bands of the Waggons now under construction are to be lengthened out as suggested by the Artillery Select Committee^[b] or not.”

[b] Meeting 186, Art. 697 page in Art. Records 431.

[c] No. 4012 dated 23d October 1855.

2. *Extract from the Proceedings of the Military Board.*^[c]—Observes “that before any final decision is given respecting the alteration, they are anxious to have the final opinion of the Artillery

“ Select Committee, and therefore request the Major General Commandant of Artillery to assemble the Committee on the Waggon made up, and report finally and fully thereon.”

OPINION.—The Committee are of opinion that their proposed lengthening of the axletree bands of the Ammunition Waggon, consequent on the additional weight thrown on the rear framing by the Carbine box, has been carried out by the Superintendent of the Gun Carriage Manufactory in a very satisfactory manner, and that the Ammunition Waggon is now sufficiently strengthened to meet all the trials of service.

Extract from the Proceedings of the Military Board No. 4392 dated 19th November 1855.

DECISION.—“ *Resolved* that all the Ammunition Waggon in the Field Train and in use be altered, and that a pattern Waggon with details of construction be prepared and submitted for the inspection of the Principal Commissary of Ordnance, to be finally approved of by the Major General Commandant of Artillery, and lodged in the Field Train, and kept as a pattern for future constructions.”

MEETING 188.

**EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT
COMMITTEE, ASSEMBLED BY ORDER OF MAJOR GENERAL F. BLUNDELL
C. B., COMMANDANT OF ARTILLERY.**

Artillery Depot Saint Thomas' Mount 15th December 1855.

PRESENT.

COLONEL P. HAMOND, *Acting Principal Commissary of Ordnance.*
LIEUT. COL. P. J. BEGBIE, *Commanding 5th Battalion Artillery.*
MAJOR G. W. Y. SIMPSON, *Director Artillery Depot.*
MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*
LIEUTENANT S. RIPPON, *Adjutant 5th Battalion Artillery.*
LIEUTENANT R. MORTON, *Adjutant 2nd Battalion Artillery.*
LIEUTENANT G. B. PRIOR, *Quarter Master 5th Battalion Artillery.*

ARTICLE 707.

ON TWO SETS OF PATTERN HARNESS FOR HORSE BATTERIES.

The following document is laid before the Committee.

*Letter ^(a) from Colonel Æ Shirreff Com-
manding Horse Brigade, to the Secretary*

^(a) No. 579 dated 30th
November 1855.

Military Board—Reports that “Two sets

*“of pattern Harness for Horse Batteries were forwarded to
“the Principal Commissary of Ordnance on the 30th Ultimo,
“and that the following differences exist between that and
“the Harness in use in the Horse Brigade”*

	Horse Brigade Harness.		Horse Battery Harness.	
	Ft.	Ins.	Ft.	Ins.
Breeching strap ...	5	5	4	5
„ Back band ...	4	0	3	9
„ Tugs ...	0	6	0	5
Centre Trace ...	8	4	8	0
„ Tugs ...	0	6	0	5
Off saddle at the point ...	1	1	1	0

“ In the Harness the single Link has been substituted for the Treble Link, as also the single Breeching crank for the double. This Horse Battery Harness has been in use with the Native Troop at Brigade Head Quarters and been found to answer perfectly well.”

Considers the alterations made to be improvements.

OPINION.—The Committee concur in the opinion expressed by the Officer Commanding the Horse Brigade, and recommend that the pattern Harness now under report be that established for all the Horse Batteries.

2 The Committee further think it worthy of consideration whether the alterations made in this Harness and reported on so favourably by Colonel Shirreff, may not with advantage be introduced into the Horse Artillery pattern also, which would have the further advantage of preserving uniformity of pattern in all the Horse Harness in the Regiment, with this difference only, that the Horse Battery Harness will be smaller than that required for Horse Artillery.

ARTICLE 708.

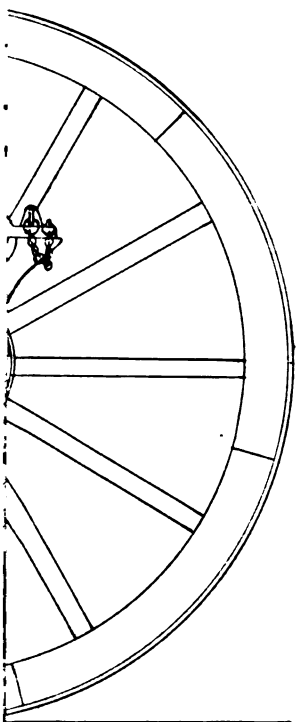
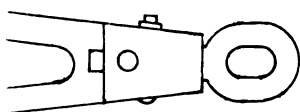
IRON CARRIAGE FOR 12 PDR. HOWITZER MOUNTAIN TRAIN, PLATES 93 AND 94.

The following documents are laid before the Committee.

1 Letter ^(a) from the Secretary Military Board to the Major General Commandant of Artillery.

(a) No. 3670 dated 2d October 1855.

tain Train.



3 feet.

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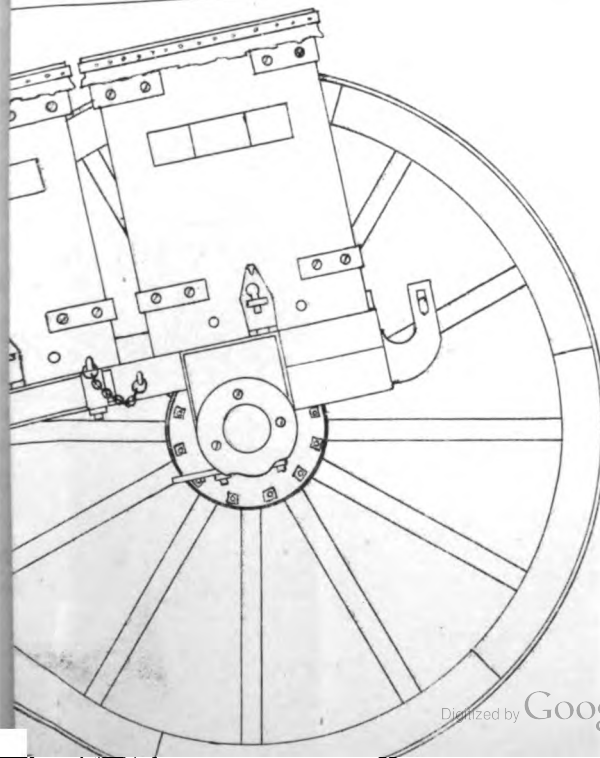
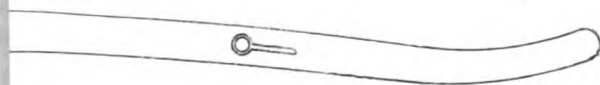
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Mountain Train.



Forwards Register of carriage for 12 Pdr. Howitzer Mountain Train, and directs that the weight, as also the pattern of this carriage be compared with the weight and pattern proposed by Major Oakes, and to decide as to whether by a diminution of the extreme elevation, the carriage cannot be reduced in weight.

(b) No. 564 dated 9th November 1855.

2 *Letter* ^(b) *from the Major General Commandant of Artillery to the Secretary Military Board.*

Reports the iron carriage for 12 Pdr. Howitzer Mountain Train having endured the proof uninjured, and notwithstanding the considerable reduction in the weight acting on the end of the trail, the recoil has neither been increased in length or rendered uneasy in character, and although this carriage is about 1 cwt. heavier than Major Oakes' pattern for the 4½ inch Howitzer, considers it inexpedient, considering the difference in the two pieces, and the difference in construction in their carriages, to reduce the weight of that now reported on, which with the 3 feet wheels appears admirably adapted for Mountain Artillery purposes. That the limber made up for the 12 pdr. iron carriage may with great advantage be substituted for the handspike heretofore fitted as a pole for Bullocks, but which was always open to objection, consequent on the difficulty of attaching it to the end of the trail, and the great length of leverage the length of trail added to length of handspike without any intermediate support, gave in draught.

(c) No. 4396 dated 13th November 1855.

3 *Extract from the Proceedings of the Military Board.* ^(c) Forwards copy of the above letter to the Superintendent Gun Carriage Manufactory, and remarks, that with so favourable a report it may be advisable to adopt this carriage as a standard.

The Board would however wish to have any trifling changes introduced which might occur to the Superintendent before finally submitting the carriage to the Artillery Select Committee:—For instance, if the maximum elevation were lower-

ed to 8,° it might be feasible to bring the piece lower down on the axletree, which will then admit of the axletree being reduced in length, for in hilly countries, or in enclosed territories like China and Malay Jungles, a few inches excess of-ten prevents the carriage going on foot paths.

OPINION.—The Committee having again carefully examined the 12 Pdr. Howitzer Mountain Train Iron Carriage, and considered its construction with regard to those particular exigencies and requirements of service which a Mountain Train Carriage would be exposed to, is of opinion that it is undesirable to make any alteration whatever in the present pattern carriage.

2 The Committee would, however, recommend that the curve of the limber shafts be at least two inches from the tire of the wheels.—In the limber under report, the distance referred to does not exceed half an inch, which is not a sufficient interval to allow for clogged wheels when the carriage is moving over a clayey or miry soil.

3 The Committee may observe, that the present length of the gun (and limber) axle is only from one to two inches more than the width of the shafts.

MEETING 189.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF MAJOR GENERAL F. BLUNDELL G. B., COMMANDANT OF ARTILLERY.

Artillery Depôt Saint Thomas' Mount 9th February 1856.

PRESENT.

COLONEL P. HAMOND, *Acting Principal Commissary of Ordnance.*

COLONEL G. ALCOCK, *Commanding 2d Battalion Artillery.*

LIEUT. COL. P. J. BEGBIE, *Commanding 5th Battalion Artillery.*

LIEUT. COL. P. ANSTRUTHER C. B., *Supt. Gunpowder Manufactory.*

MAJOR G. W. Y. SIMPSON, *Director Artillery Depot.*

MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*

MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*

LIEUTENANT R. MORTON, *Adjutant 2nd Battalion Artillery.*

ARTICLE 709.

ON A REVISED ALLOTMENT OF ARTIFICERS AND ARTIFICERS TOOLS.

The following documents are laid before the Committee.

(a) No. 265, 5th August 1854. 1 *Letter^(a) from the Brigadier Commandant of Artillery to the Secretary Military*

Board.—Brings to notice that no provision whatever is made for supplying Native Carpenters, attached to Batteries of Horse and Foot Artillery, with tools when in Garrison or Cantonment; and considers it decidedly for the advantage of the service, that Native Artificers attached to Batteries of Horse and Foot Artillery, whether working in Arsenals, or with their Batteries, be provided in Cantonment, as they already are in the field, with the necessary tools; and that they be required to perform all battery work with those tools.

(b) No. 3856, 9th October 1854. 2. *Letter^(b) from the Secretary Military Board to the Brigadier Commandant of Artillery*—acquaints him, that Government have called for a

draft of an order to give effect to his wishes conveyed in his letter No. 265 of the 5th August 1854, and suggests that the list of tools be carefully reconsidered, and those laid down in G. O. G. 205 of 7th September 1847, also in the Board's Circular Order No. X of 5th April 1836, page 133, be all embraced in one order.

(c) No. 386, 2d November 1854.

3. *Letter^(c) from the Brigadier Commandant of Artillery to the Secretary Military Board.* Submits a revised allotment of tools for the use of Artificers attached to Batteries of Horse and Foot Artillery; considers that it would be obviously more satisfactory to have an allotment equally divisible by 3, to equip each separate division when detached; but the present establishment of Artificers being only divisible into two parts, it has been deemed inexpedient to encumber the Batteries with more than is at present required, leaving to the future any modifications necessary, should the establishment of Artificers be hereafter augmented.

(d) No. 5782, 20th December 1854.

4. *Letter^(d) from the Secretary Military Board to the Brigadier Commandant of Artillery.* Encloses a Report from the Principal Commissary of Ordnance with list of tools arranged in chests; one complete set of tools for a complete Battery; also the allotment for a half Battery or division; and one for the Troop or Company without Ordnance;—and requests a report thereon.

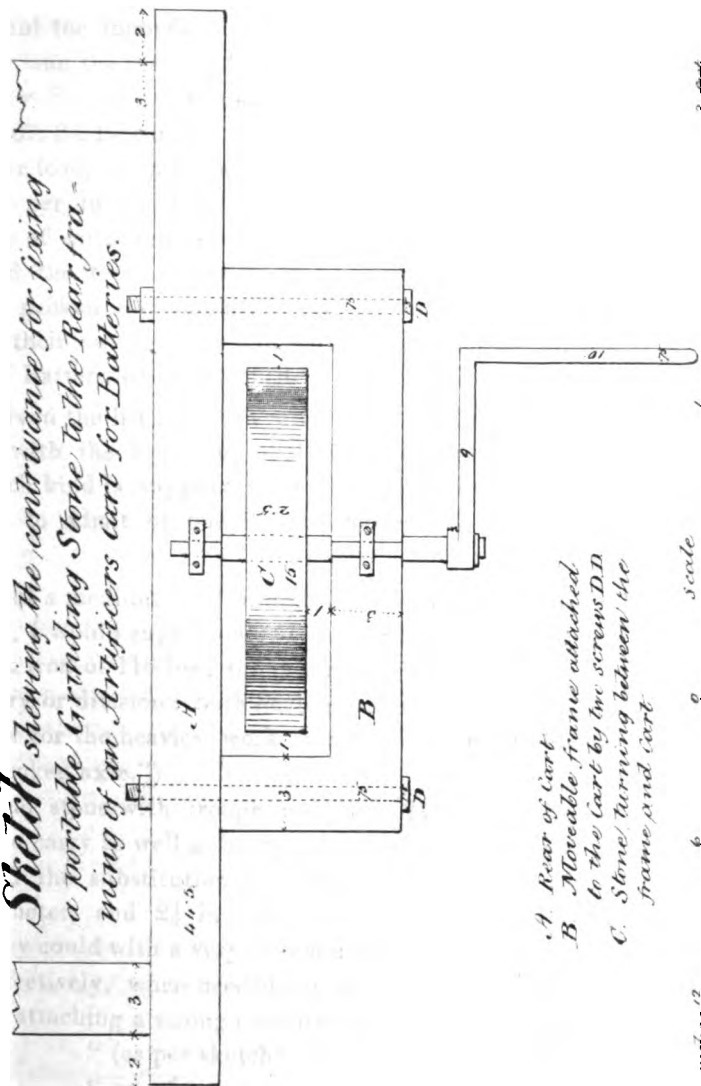
(e) No. 60, 12th February 1855.

5. *Letter^(e) from the Brigadier Commandant of Artillery to the Secretary Military Board.* Submits observations on the chests of tools received from the Grand Arsenal, and suggests the following arrangements.

“ In the Artificers cart, recommended as the lightest, most
 “ commodious, and serviceable, after severe and satisfactory
 “ tests by two Troops of Horse Artillery on long marches

. Artillery Select Committee Meeting 189. Article 709

*Sketch showing the contrivance for fixing
a portable Grinding Stone to the Rear fra-
ming of an Artificers Cart for Batteries.*



“ to Jaulnah and back, and established by the Board’s letter
 “ No. 4944 of 13th August 1852, provision is made for all
 “ tools needful for immediate use with the Battery on any
 “ emergency, and the rest of the allotment is recommended
 “ by Artillery Select Committee Proceedings, Article 604,
 “ Meeting 167, 3d February 1851, to be carried on carts at
 “ 700 lbs. per load, or on Camels at 320 lbs., or on Bullocks
 “ at 120 lbs. per load. This arrangement I do not think
 “ susceptible of much improvement, and I would therefore
 “ recommend the tools, extra to those carried in the said
 “ cart, to be packed in common portable size boxes, equally
 “ useful for their carriage with the Battery ; and for the use
 “ of the half Battery when detached.”

“ The tools in the list herewith returned, I would leave as
 “ they are, with the exception of those in which a single
 “ tool of each kind is supplied, and which I would give in
 “ duplicate, to admit of one of each going with the half
 “ Battery.”

“ Instead of a medium anvil of 286 lbs. and 2 beak irons
 “ of 232 lbs., I would supply only 1 small anvil of 116 lbs.,
 “ and 1 beak iron of 116 lbs., the latter to be detached with
 “ half Battery or division ; both having proved to be suscep-
 “ tible of use for the heaviest work in a Battery (the weld-
 “ ing of a broken axle.”)

“ The grind stone with trough weighing 384 lbs., is so
 “ awkward to carry as well as heavy, that I would strongly
 “ recommend the substitution of stones not exceeding 15
 “ inches diameter, and $2\frac{1}{2}$ in thickness, and instead of a
 “ trough, they could with a very easy and simple contrivance,
 “ be used effectively, when needed, at the rear of the cart,
 “ by simply attaching a strong cleat by two bolts, with nuts,

• Plate 95.

“ (as per sketch*) between which and the
 “ rear frame of the cart, the stone could
 “ be turned, and the man who turns with one hand, could
 “ with the other supply it with water, and so provide all

“ that is needed, without any considerable addition to the weight, like the present machine.”

(f) No. 584, 11th August 1855.

6. *Letter^(f) from the Superintendent Gun Carriage Manufactory, to the Acting Director Artillery Depôt.* Transmits a list of Articles contained in the Artificers' cart, and on the platform cart forwarded to the Depôt.

(g) No. 452, 6th September 1855.

7. *Letter^(g) from the Major General Commandant of Artillery to the Secretary Military Board.* Reports having received from the Gun Carriage Manufactory, the boxes of tools for Light Field Batteries, with the suggested alterations in the fittings of the box carried on the Artificers' cart completed, conceives the arrangements have been satisfactorily matured, and may be established for general introduction. Draws attention to the allotment of tools “ For a Troop or Company without Ordnance,” but which might with good propriety and advantage be now abolished, as in such circumstances, its Artificers are superfluous and their tools useless.

(h) No. 4528, 30th November 1855.

8. *Letter^(h) from the Secretary Military Board to the Major General Commandant of Artillery.* Suggests the recognition of the present allotment of Artificers as a Regimental Establishment, instead of one by Companies, and told off whenever their services would be most required, but entirely under Regimental arrangement ; and submits for consideration the possibility of forming a regular workshop at Artillery Head Quarters, for giving the Artificers employment.

OPINION.—The Committee having attentively considered the several Statements connected with the proposed revised allotment of Artificers and Artificers' tools for Batteries and Companies, beg to observe, that the former question being under reference to authority, they consider it advisable to wait further instructions before proceeding with its discussion.

2. The Committee are of opinion that the proposed division, arrangement, and packing of tools for Batteries, so that on the occasion of a Division, or half Battery being detached, a due proportion of tools, conveniently packed, may accompany either, is a judicious and advantageous arrangement, and the Committee therefore recommend its adoption in all Batteries.

3. The Committee cannot but regard the allotment of a large chest of tools for a Company in Cantonment—tools which by the Regulations of the service, the Artificers are not permitted, under the circumstances, to use—as a mere needless burthen and incumbrance, adding to the already heavy responsibility of Company Commanding Officers.

4. A Company on receiving its guns and Battery equipments, would receive, at the same time, the approved allotment of tools for its Artificers.

DECISION.—*G. O. G. No. 130, 29th April 1856.*—The Right Honorable the Governor in Council is pleased to authorize the following allotment of Tools for a Light Field Horse Battery, Troop of Horse Artillery, or Battery drafted by bullocks, and to direct that the proportions of tools may be sent with a half Battery or a Division as shown in the list or in such proportions as the service may appear to render necessary.

When Companies of Artillery may be serving without Ordnance, the Military Board will regulate the issue of tools and half yearly supplies, according to the arrangements which may be made for maintaining the Arms and Accoutrements in an efficient state.

The Military Board will issue such subsidiary instructions as may be requisite for maintaining supplies of tools, tool chests, and boxes for half yearly supplies, and for giving effect to the above order.

Revised Allotment of Artificers' Tools for a Light Field Battery, as proposed by the Permanent Artillery Select Committee in Meeting 189, Article 709, of the 9th February 1856.

Articles.	Total for a Light Field Battery.				Proposed to be carried in Col. Conran's Artificer cart, for a half Battery.				Proposed to be carried on Store carts, country carts, Camels, Bullocks, or coolies.			
	Total for a Light Field Battery.				Proposed to be carried in Col. Conran's Artificer cart, for a half Battery.				Proposed to be carried on Store carts, country carts, Camels, Bullocks, or coolies.			
	No.	lbs.	ozs.	dtrs.	No.	lbs.	ozs.	dtrs.	No.	lbs.	ozs.	dtrs.
Augers Iron, Carpenter 1 inch	2	3	1	0	1	1	8	8	0	0	0	0
" " "	2	2	6	4	1	1	3	0	1	1	3	0
" " "	2	2	7	12	1	0	12	0	0	0	0	0
" " "	2	1	5	8	1	0	0	0	1	0	10	8
Adzes, Iron Carpenter Europe with handles.	2	7	9	0	2	7	9	0	0	0	0	0
Awis, brad.	2	2	0	0	0	0	0	0	1	0	1	0
Axes, hand Europe with helves	2	5	6	0	1	2	10	0	0	0	11	8
" felling "	2	13	4	0	0	0	0	8	1	6	5	8
Bellows, forge country large with pipes . . pairs.	2	8	9	0	2	8	9	0	0	0	0	0
Bracons, Carpenter's with bits.	2	10	10	0	0	0	0	0	1	5	5	0
Brushes for glue pot.	2	0	2	0	0	0	0	0	1	0	1	0
Chisels, cold	2	6	4	8	6	6	4	8	0	0	0	0
" Carpenter firmer 1 1/4 inch.	2	10	11	12	1	0	10	0	0	0	0	0
" " "	2	0	10	4	1	0	5	0	1	0	6	0
" " "	2	0	5	0	0	0	2	8	1	0	5	4
" " "	2	0	3	0	1	0	0	0	1	0	2	8
" " "	2	2	0	8	0	0	0	1	0	0	0	0
" " "	2	1	13	0	1	0	1	8	1	1	1	0
" " "	2	1	5	12	1	0	0	0	1	0	15	8
" " "	2	1	0	12	1	0	10	8	1	0	0	0
" " "	2	89	12	0	0	0	0	8	1	0	9	4
Total				4	32	1	1	17	13	19	13	0

	69	12	0	32	1	4	1	17	13	12	19	13	0
Compasses, iron Carpenter's common, .....pairs	2	0	8	1	0	4	1	0	4	0	0	0	0
" " " Coopers and millwright	2	1	8	0	0	0	1	0	8	8	1	9	0
" " " with sweep .....pairs	2	0	13	0	0	7	0	0	0	0	1	6	8
" " " iron callipers smith	2	0	8	0	0	0	0	0	4	4	1	4	8
Chalk lines.....	2	0	12	0	1	12	0	0	0	0	0	0	0
Drivers, screw.....	2	1	12	8	2	8	0	3	5	4	3	6	4
Engravers for iron	6	0	11	8	0	0	0	0	2	4	0	2	0
" " " brass	6	0	4	4	6	9	7	0	0	0	0	0	0
Files, flat rough	6	9	7	8	6	8	12	0	0	0	0	0	0
" " " 14 inch	7	6	8	6	7	8	12	0	0	0	0	0	0
" " " 12 "	7	0	15	2	7	8	12	0	0	0	0	0	0
" " " 10 "	2	0	8	2	0	15	12	0	0	0	0	0	0
" " " 8 "	2	0	8	2	0	8	12	0	0	0	0	0	0
" " " 1/2 round rough	2	1	11	1	11	8	0	0	0	0	0	0	0
" " " smooth	2	1	4	2	1	7	4	0	0	0	0	0	0
" " " 3 square rough	1	1	4	2	1	4	0	0	0	0	0	0	0
" " " 8 "	2	3	4	2	3	4	0	0	0	0	0	0	0
" " " 14 "	2	0	6	2	0	6	8	0	0	0	0	0	0
" " " 10 "	2	0	6	2	0	6	8	0	0	0	0	0	0
" " " saw, hand	2	0	1	2	0	7	8	0	0	0	0	0	0
" " " tenon	2	0	4	2	0	4	8	0	2	4	1	2	8
Gimblets, Carpenter's	2	0	2	0	0	0	0	0	0	0	0	0	0
" " "	2	0	2	0	0	0	0	0	0	0	0	0	0
" " "	2	0	1	0	0	0	0	0	0	0	0	0	0
" " " flatter	2	0	2	0	0	0	0	0	0	0	0	0	0
Gauges, firmer Carpenter	2	0	9	0	0	0	0	0	4	12	1	4	8
" " "	2	0	15	12	0	0	0	0	4	12	1	4	8
" " "	2	0	6	0	0	0	0	0	2	12	1	4	8
" " " socket	2	2	1	8	0	0	0	0	2	8	1	1	15
" " "	2	1	12	0	0	0	0	0	12	8	1	15	8
" " "	2	1	6	0	0	0	0	0	10	4	1	11	12
" " "	2	0	8	0	0	0	0	0	4	4	1	3	12
Gauges, Carpenter's common Europe.	2	0	8	0	0	0	0	0	0	0	0	0	0
Hammer, sledge with helve Europe.	24	13	0	1	2	8	0	1	5	0	0	0	0
" " claw Europe.	2	4	13	0	2	8	0	1	5	0	0	0	0
" " hand with helve Europe.	2	7	5	8	2	8	0	0	0	0	0	0	0
" " rivetting	2	3	6	0	2	6	0	0	0	0	0	0	0
Handles for tools.....	12	1	13	8	10	8	0	0	0	0	0	5	8
	152	4	8	100	9	0	0	25	11	0	26	0	8

Articles.	Total for a Light-armed Field Battery.				Proposed to be carried in Col. Conran's Artificer cart, for a half Battery.				Proposed to be carried on Store carts, country carts, Camels, Bullocks or coolies.			
	No.	lbs.	ozs.	dtrs.	No.	lbs.	ozs.	dtrs.	No.	lbs.	ozs.	dtrs.
Iron, few.....	2	152	4	8		100	9	0		25	11	0
Locks, pad iron single Europe 2 1/2 inches.....	3	4	8	0	2	4	8	0	0	0	0	8
Mallet, Carpenter's.....	2	1	8	8	1	0	11	8	1	0	0	0
Pincers iron common.....	2	5	3	8	0	0	0	0	1	0	6	8
Planes, jack.....	2	3	2	12	0	0	0	0	1	2	11	0
Planes, trying.....	2	9	1	8	1	4	13	0	1	1	10	0
" smoothing.....	2	13	14	4	1	7	4	4	0	6	0	0
" rabbling.....	2	4	8	0	0	0	0	0	0	6	10	0
Pokers, Smith of sorts.....	2	2	10	0	0	0	0	0	1	2	3	0
Pots, glue copper.....	2	4	1	8	0	0	0	0	1	1	6	0
Plates, screw with taps large.....	2	5	7	0	0	0	0	0	1	2	1	8
" " small.....	2	11	11	12	1	6	14	4	0	3	6	8
Punches, steel Smiths.....	4	3	10	0	1	1	15	8	1	1	4	13
Rasps, 4 round 8 inch.....	4	0	8	0	4	0	8	0	0	0	0	0
Rules, Carpenters 2 feet.....	4	1	2	12	2	0	9	4	0	0	0	0
Saws, hand (27 inch).....	2	0	17	0	0	0	0	0	0	2	0	9
" tenon (20 ").....	2	3	13	0	1	2	0	8	1	0	3	8
Setters, saw hand.....	2	5	8	12	1	2	13	4	0	2	11	8
Stamps, figure (9 per set).....	2	0	5	0	1	0	0	0	0	0	0	0
" letters (26 ").....	2	1	11	0	0	0	0	0	0	0	0	0
Spoke, shaves Carpenters common.....	2	6	5	8	0	0	0	0	1	1	14	0
Squares, Carpenters 6 inch with steel blade.....	2	0	12	4	0	0	0	0	0	3	6	0
	2	0	14	4	0	0	0	0	1	0	6	4
	2	0	14	4	0	0	0	0	1	0	7	0
		243	2	12		132	13	4		59	14	4

Stence, oil Turkey.....	2	243	2	12	132	13	4	50	7	4	69	14	4
" rag blue.....	2	5	16	0	1	3	8	0	0	0	1	2	8
" grading Europe small with trough.....	2	2	4	8	1	1	0	1	1	8	0	0	0
Teaps, Smith of sorts.....pairs	1	66	12	0	1	66	0	0	0	0	0	0	0
Tools, nail for heading.....	4	16	5	0	2	7	8	1	4	0	1	4	8
Vices, bench iron Europe.....	2	4	3	0	2	4	3	0	0	0	0	0	0
" hand " ".....	2	20	15	8	2	20	8	0	0	0	0	0	0
" hand " ".....	2	2	9	0	2	2	9	0	0	0	0	0	0
Chests, for tools empty.....	0	0	0	0	0	82	0	1	36	8	1	36	0
" " fitted.....	0	0	0	0	0	311	8	12	92	6	12	103	4
Anvil, iron Smith small, 1 cwt.....	1	116	0	0	1	116	0	0	0	0	0	0	0
Iron, beak Smith.....	1	80	0	0	1	80	0	0	0	0	0	0	0
Vices, standing Europe 3d size (44 lbs. each).....	2	88	0	0	2	88	0	0	0	0	0	0	0
		636	2	12		595	8	12	92	6	12	103	4

HALF WROUGHTS.									
	1319	512	824	711	97	313	107	11	4
Spokes.....	24	340	0	0	0	0	0	0	0
Felloes.....	12	182	0	0	0	0	0	0	0
Poles.....	2	191	0	0	0	0	0	0	0
Splinter bars.....	2	64	0	0	0	0	0	0	0
Axletree beds.....	2	133	0	0	0	0	0	0	0
In addition to the Leather Tannery &c. included in the half yearly supply, the following is proposed to be carried in Col. Conran's cart.									
Hides, bullocks 1st sort.....	0	9	4	0	0	0	0	0	0
" " 2d ".....	0	6	8	0	0	0	0	0	0
Leather, common.....	0	10	0	0	0	0	0	0	0
Sheep skins.....	0	3	0	0	0	0	0	0	0
Fokers' iron.....	2	2	0	2	0	0	0	0	0
Total.....	2290	114	855	313	97	313	107	11	4
							1257	7	0
									489
									8

(Signed) G. W. Y. SIMPSON, Major,
Director Artillery Depot.

ARTILLERY DEPÔT,
ST. THOMAS' MOUNT,
9th February 1856.

ARTICLE 710.

ON AN EXPERIMENTAL LIMBER FOR ALL HEAVY FIELD GUNS AND HOWITZERS.

The experimental Limber reported on by the Select Committee,^(a) and recommended to be tested by a march to a distant Station, having been taken out for ten successive days over ground in the vicinity of the Mount, the centre framing and front cross bar were fractured on the tenth day, and the Limber is again submitted for the report of the Committee.

The undermentioned documents are laid before the Committee.

(a) Meeting 185, Article 687, 29th March 1855, page 416, Artillery Records.

1. *Letter^(b) from the Acting Principal Commissary of Ordnance to the Secretary Military Board.*—Recommends that the experimental Heavy Field Limber for all calibres with a 24 pdr. Gun be despatched to Secunderabad, as originally intended.

(b) No. 2487, 12th December 1855.

2. *Extract from the Proceedings of the Military Board^(c).*—Forwards copy of the above letter to the Major General Commandant of Artillery, and requests that he will arrange for such experiment as he shall consider sufficient.

(c) No. 4932, 14th December 1855.

3. *Letter^(d) from the Director Artillery Depot to the Officer Commanding Artillery Centre Division, Mount.*—Places the experimental Limber with a heavy field gun and carriage at his disposal, and requests that he will cause the Limber to be severely tested over difficult ground in the vicinity of the Mount.

(d) No. 14, 7th January 1856.

4. *Letter^(e) from the Officer Commanding Artillery Centre Division to the Director Artillery Depot.*—Reports that the “Carriage and Limber” was taken out daily for ten successive days over diffi-

“cult ground for the purpose of testing it, and that on the tenth day when passing over some rocky ground, the centre framing as also the front cross bar of the Limber split, and on the way back these parts were shaken to pieces, there did not appear any crack or damage done on the previous days, and the ground over which it was taken, was in part rocky and in other parts hollow and uneven, but not of a nature particularly trying.”

OPINION.—The Committee having inspected the proposed Limber adapted for all Heavy Field Guns and Howitzers, condemn its construction as mechanically faulty, and too slight and weak for the office it has to perform.

2. The Committee are of opinion that the dimensions of wheels and frame, existing in the present pattern Heavy Field Limber, offer greater advantages than any other pattern Limber yet placed before them; they recommend, therefore, that the only alteration made be in the position of the pole, so that the present Limber may be equally well adapted for either Heavy Field Guns or Howitzers.

Extract from the Proceedings of the Military Board No. 6282, dated 8th March 1856.

DECISION.—*Resolved* to send a copy of the above Proceedings to the Superintendent Gun Carriage Manufactory, with a request to prepare a Limber in accordance with the suggestion of the Committee.

ARTICLE 711.

ON STRENGTHENING THE FRAMING OF THE AMMUNITION CARTS, MOUNTAIN TRAIN, OF MAJOR OAKES' PATTERN.

An Ammunition Cart, Mountain Train, under the charge of Major Haly, Commanding the Malabar Police Corps, having failed whilst testing it on a march, the undermentioned documents are laid before the Committee with a view to obtaining their opinion as to the best mode of strengthening the framing of these carts.

(a) No. 244, 29th November 1855.

1. *Letter^(a) from Major G. F. Haly, Commanding Malabar Police Corps to Captain J. Denton, Depy. Commissary of Ordnance Cannanore.*—Reports the breaking of the Ammunition Cart frame, which he considers “to have been occasioned from want of “substance and strength in the front section bars on which “the whole leverage of the pole or shafts bear;” is of opinion that “the whole of the frame work of these carts are of “too fragile a nature to stand the work intended for them” and that “a continuation of the underneath iron strengthening bar, round and over the section would undoubtedly “have prevented so complete and sudden rupture.”

(b) No. 472, 3d December 1855.

2. *Letter^(b) from Captain J. Denton to Major G. F. Haly.*—Requests to be informed, how the Ammunition cart frame was conveyed, at the time it was broken.

(c) dated 11th December 1855.

3. *Letter^(c) from Major G. F. Haly to Captain J. Denton.*—States that the “Ammunition Cart” at the time the frame was broken, was being drawn by a pair of bullocks.

[d] No. 513, 17th December 1855.

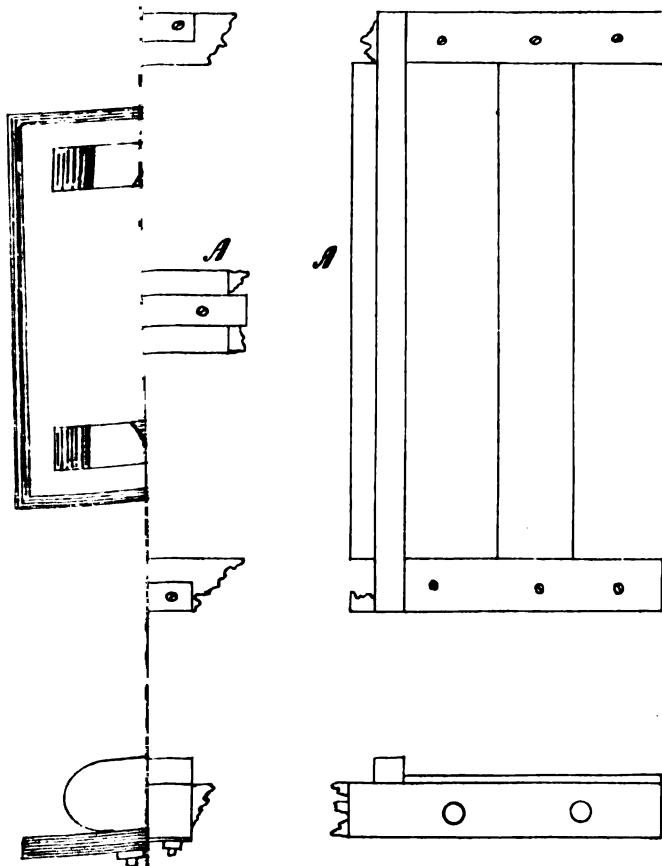
4. *Letter^(d) from Captain J. Denton to the Secretary Military Board.*—Encloses copies of the above communications, together with a sketch* of the frame, shewing the nature of the injury caused to it, and considers that, a continuation of the axletree bands to the ends of projections of the side frames of the front section would have strengthened it more.

* Plate 96.

[e] No. 32, 12th January 1856.

5. *Letter^(e) from the Supt. Gun Carriage Manufactory to the Secretary Military Board.*—States, with reference to the foregoing correspondence “that as it appears to me that the whole weight of “the contents of the Ammunition boxes rests entirely on “the two side frames supported by the axletrees, I am of “opinion that in order to distribute the weight equally on

on Cart Frame
ch.



ference

ken in two pieces
and supported by Axtree band
shed

Madra

H. J. Kouwen. Lithog.

“ the cart, the centre frame should have a perch similar to
 “ the Light Field Waggon. The shafts instead of being
 “ bolted on as they are at present, should be let into iron
 “ sockets on the side framing, and secured there by means
 “ of pins.”

“ The additional weight may perhaps require more bul-
 “ locks in draught, and it therefore becomes a question how
 “ far it is expedient to retain a cart as part of the equip-
 “ ments, and whether it would not be better for mountain
 “ and jungle paths to have the Ammunition carried on the
 “ backs of bullocks.”

[f] No. 5341, 18th Janu- 6. *Extract from the Proceedings of the*
 ary 1856. *Military Board*⁽¹⁾. Forwards copy of the
 above letter from the Superintendent Gun Carriage Manu-
 factory for the early report of the Major General Comman-
 dant of Artillery.

OPINION.—The Committee, under the conviction that a
 Mountain Train should be encumbered with as few wheeled
 carriages as the necessities of service may render possible, re-
 commend the discontinuance, as part of the Mountain Train
 Equipment, of the cart, which lately failed on the Western
 Coast. The Committee are of opinion that all the Ammu-
 nition, in excess of that in the limber, should be so packed
 as to admit of being carried, either on pack cattle, or by
 bamboo coolies. The Committee having recommended the
 discontinuance of the cart, have not entered on the question
 of strengthening its frame work.

ARTICLE 712.

ON SPUNGE STAVES OF 68 AND 56 PDR.. AND 8 INCH GUNS.

The following documents are laid before the Committee.

- [2] No. 240, 28th Janu- 1. *Letter^(a) from the Acting Principal*
 ary 1856. *Commissary of Ordnance to the Secretary*

Military Board.—Brings to notice that the sponge staves of the 56 Pdr. 8 inch and 68 Pdr. guns are, from their length and weight, most inconvenient for use, and suggests that all pieces of that kind should have two staves, one for the sponge, and the other for the rammer head.

[b] No. 5599, 30th January 1856.

2. *Extract from the Proceedings of the Military Board.*^[b]—Resolved to request the Major General Commandant of Artillery to submit this at once to the Select Committee, to allow of the alteration for the Singapore equipment.

OPINION.—The Committee in looking to the statements submitted regarding the great weight of the sponge staves for 68 pdr., 56 pdr., and 8 inch guns, where both rammer head and sponge head are on the same staff, recommend that they be made up separately, as suggested by the Principal Commissary of Ordnance.

Extract from the Proceedings of the Military Board No. 6291, dated 8th March 1856.

DECISION.—*Resolved* to send a copy of the above Proceedings to the Principal Commissary of Ordnance for information and guidance.

MEETING 190.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL Æ. SHIRREFF, BRIGADIER COMMANDANT OF ARTILLERY.*Artillery Depot Saint Thomas' Mount 13th May 1856.***PRESENT.**LIEUT. COL. P. J. BEGBIE, *Commanding 5th Battalion Artillery.*MAJOR G. W. Y. SIMPSON, *Director Artillery Depot.*MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*MAJOR W. K. WORSTER, *Barrack Master and Supt. Govt. Roads.*CAPTAIN E. T. FASKEN, *Adjutant 2nd Battalion Artillery.*LIEUTENANT W. J. BRADFORD, *2nd Battalion Artillery.*

ARTICLE 713.**METHOD OF FIXING A GRINDING STONE TO THE REAR FRAMING OF AN ARTIFICERS CART, PROPOSED BY MAJOR G. ROWLANDSON, HORSE ARTILLERY.**

(a) No. 60, dated 12th February 1855. The following Extract from a letter^(a) from Colonel G. Conran, Brigadier Commandant of Artillery to the Secretary Military Board, is laid before the Committee.

“The Grindstone with trough weighing 384lbs., is so awkward to carry, as well as heavy, that I would strongly recommend the substitution of stones not exceeding 15 inches diameter and $2\frac{1}{2}$ in thickness, and instead of a trough, they could with a very simple and easy contrivance, be used effectively when needed, at the rear of the cart, by simply attaching a strong cleat by two bolts with nuts (as per sketch*), between which and the rear frame of the cart, the stone could be turned, and the man who turns with one hand, could with the other supply it with water, and so provide all that is

* Vide plate 95, to Article 709, page 469.

“needed without any considerable addition to the weight
“like the present machine.”

OPINION.—Although the Committee cannot recommend the general adoption under all circumstances of the proposed method of fixing the grindstone on the rear framing of the Artificers Cart, they would suggest that a sketch of the rear framing with grindstone attached should be furnished to batteries, as it may occasionally be convenient and advisable to fix the stone as proposed.

Extract from the Proceedings of the Military Board No. 610, dated 28th May 1856

DECISION.—The Superintendent Gun Carriage Manufactory to furnish a drawing as suggested, for publication with the Proceedings of the Committee.

ARTICLE 714.

**ON A MOVEABLE KIND OF SEAT FOR THE MEN WHO RIDE
ON THE LIMBERS OF LIGHT FIELD CARRIAGES.**

(a) Meeting 187, Article 703, 5th Novr. 1855, page 454, Artillery Records.

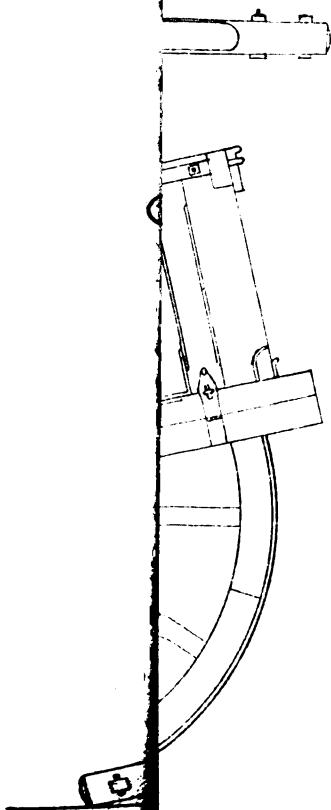
The Committee having recommended^(a) that their decision on this subject be deferred until the practice obtaining in this respect at other Presidencies can be ascertained; the under-mentioned documents containing the required information, are laid before them.

(b) No. 108, 8th January 1856.

1. *Copy of Letter^(b) from the Secretary Military Board Bombay to the Secretary Military Board Madras.*—States that “since the practice of stuffing the lids of Ammunition Boxes was discontinued, cushions of leather have been supplied by Officers Commanding Troops and Batteries.”

(c) No. 6068, 21st February 1856.

2. *Extract from the Proceedings of the Military Board^(c).*—Requests the attention of the Major General Commandant of Artillery to Appendix 11, page 1056 of the Pay and Audit Regulations of Bengal Edition of 1845, where it will be seen that seats are



to be repaired and renewed at the expense of the Officers drawing the contingent Government allowance, and as no such allowance exists in Madras it falls on Government.

OPINION.—The Committee are informed that seats of the description suggested, are used in Bengal, and they recommend that application be made for the supply of similar seats to Batteries of the Madras Artillery.

Extract from the Proceedings of the Military Board No. 648, dated 26th May 1856.

DECISION.—The Superintendent Gun Carriage Manufactory to prepare seats as proposed, and submit the same for approval

ARTICLE 715.

ON A PATTERN STORE CART FOR LIGHT FIELD BATTERIES (PLATE 97.)

The following documents are laid before the Committee.

(a) No. 98, 16th February 1856. 1 *Letter^(a) from the Major General Commandant of Artillery to the Secretary Military Board.*—Recommends that immediate instructions be given to the Superintendent Gun Carriage Manufactory to construct a cart for submission to the Permanent Artillery Select Committee :—suggests that the frame work and wheels be precisely similar to those of Colonel Conran's Artificer Cart, with sides of the same pattern as the carts constructed in 1850, and sent with the A. Troop Horse Artillery to Jaulnah for report.

(b) No. 143, 25th February 1856. 2. *Letter^(b) from the Superintendent Gun Carriage Manufactory to the Secretary Military Board.*—States that he considers the cart proposed by the Commandant of Artillery just what is required, and if the Board permit him, he will carry out the views of the Commandant of Artillery, by fitting up a box of an Artificer Cart now at the Manufactory with frame work and wheels for approval.

(c) No. 6087, 27th February 1856. **3. *Extract from the Proceedings of the Military Board*^(c).**—Approves of the above, and forwards copy of letter to Artillery Head Quarters.

OPINION.—That the proposed Store Cart for Light Field Batteries is strong, light, and roomy and admirably adapted for the purpose for which designed. The Committee therefore recommend the introduction of this Cart as part of the Equipment of the Field Batteries of the Regiment.

DECISION.—“ The Board wish to see the allotment of Carts told off for Batteries, “ so as to define clearly the exact number “ to be maintained with each Battery and shewing the mode “ of carrying the Stores, Tools, &c. of a Battery.”

Extract from the Proceedings of the Military Board No. 620, dated 28th May 1856.

ARTICLE 716.

ON THE PROPORTION BETWEEN THE HEIGHT AND LATERAL BASE OF GUN CARRIAGES.

(a) No. 6484, 12th March 1856. The Military Board direct^(a), that the undermentioned correspondence be laid before the Select Committee, with a view to having the valuable information contained therein made public.

(b) No. 103, 9th February 1856. **1. *Letter*^(b) from the Superintendent of the Gun Carriage Manufactory to the Secretary Military Board.**—Forwards plan of a 12 pdr. Howitzer Mountain Train Carriage, and questions the soundness of the principle or rule given in the following Extract from the Military Board's Proceedings,^(c) which rule

(c) No. 4581, 28th November 1855. if true, would show the neat, strong, and well proportioned little Mountain Train Carriage now approved of by the Select Committee all out of proportion.— “ With reference to the proposed breadth of the axle, the “ Board again point out a principle not touched upon by the “ Superintendent of the Gun Carriage Manufactory, and that “ is, the due proportion of the weight above the ground, that

“ is to prevent the piece being top heavy, this may be expressed in various ways, but a good practical rule will be applied, if the breadth of the axle from wheel to wheel be equal to one and a half times the height of the piece (centre of muzzle) from the ground.”

(d) No. 5827, 12th February 1856.

2. *Extract from the Proceedings of the Military Board.*^(d)—Requests the Superintendent Gun Carriage Manufactory to explain to the Board, the true principle or rule for regulating the widths of the axle in reference to the position of the piece from the ground, and to make a few experiments, testing the power or weight required for upsetting a gun mounted on a carriage, with axles of varying widths, and with wheels of different diameters.

(e) No. 125, 16th February 1856.

3. *Letter*^(e) *from the Superintendent Gun Carriage Manufactory to the Secretary Military Board.*—States that he has “ never heard of any fixed rule or principle for regulating the width of Gun Carriage axles, which has been determined at Madras or Bengal according to the views of the Artillery Officers, and as the one prefers a greater width than the other, the wheels of the Bengal Light Field Carriages are several inches further apart than in the Madras Carriages.”

Requests that the Military Board will have the experiments they wish carried out on this subject, conducted by some Officer at the Mount, and annexes a tabular statement shewing the measurements of various carriages in use, and the application of the rule mentioned by the Board thereto.

RULE.

The breadth of axle from wheel to wheel to be equal to one and a half times the height of the piece (centre of muzzle) from the ground.

	Distance from ground line to centre of muz- zle at point blank.	Breadth of axle from wheel to wheel.			
	Inches.	Inches.	Inches.		
LIGHT FIELD CARRIAGES.					
6 Pounder Gun.....	44½	62	{ 1½ less than what it ought to be according to the rule given.		
9 " ".....	44½	62	4½	do.	do.
12 " Howitzer.....	45½	62	6½	do.	do.
24 " ".....	47½	62	8½	do.	do.
HEAVY FIELD CARRIAGES.					
12 Pounder.....	49½	70½	4	do.	do.
18 " ".....	50½	70½	5½	do.	do.
24 " ".....	50½	70½	5½	do.	do.
10 Inch Iron Carriage axle 44 inches	46	63	6	do.	do.
Do. axle 36 "	46	55	14	do.	do.
8 Inch Iron Carriage axle 44 inches	43	63	1½	do.	do.
Do. axle 36 "	43	55	9½	do.	do.
12 Pdr. Howitzer Mountain Train Iron Carriage.....	24	26	10	do.	do.

(Signed) J. MAITLAND, Major,

Supt. Gun Carriage Manufactory.

GUN CARRIAGE MANUFACTORY, }
MADRAS, 16th February 1856. }

(f) dated 28th February 1856. 4. *Letter^(f) from the Superintendent Gunpowder Manufactory to the Secretary Military Board.*—Submits observations on the above correspondence and states that “The true principle is to ascertain by “measurement what was the breadth of base, outside of “tires, allotted to those carriages which were intended to “move with the greatest speed over all sorts of ground; to “surpass in speed the lightest cavalry, *and did it*. That is “to say, measure the 6 pdr. gun carriages which served the “Madras Horse Artillery throughout the Pindarree War.”

The lateral base of a carriage of General Cullen's construction is 64 inches, the height from ground line to top of cap-square 48 inches, height 48 breadth 64 is as 3 : 4.—Fully concurs in the proportion of height to breadth laid down by the Board, viz. 3 to 4.5, which he would retain for all Gun Carriages.

Observes that in the paper furnished by the Superintendent Gun Carriage Manufactory, shewing the actual proportions between height and lateral breadth, the breadth is given as "*from wheel to wheel*" apparently giving the space *between* the tires or 6 inches less than the real lateral base, which should be measured and stated thus, "From outside of right to outside of left wheel," or in other words, "True breadth of lateral base."

"But taking his table, the guns which have to gallop are "the 6 pdr. and 12 pdr. Howitzer."

Height.	Breadth from wheel to wheel i. e. between wheels.	Proportion adding breadth of tires.
6 Pdr. is 44½.....	62.....	44½ : 68.
12 " 46	62.....	46 : 68.

"The proportion laid down by the Military Board is very "close upon this."

OPINION.—The Committee are of opinion that the general rule alluded to by the Military Board is sound and judicious in principle, but as this is a question open to many modifying contingencies, it is desirable that the proportion of base to height, together with the angle of displacement. (That is when a vertical plane passing through centre of gravity falls outside the fellie resting on the ground) for each piece on its carriage, should be prepared in a tabular form for the future consideration of the Committee.

2. The Committee observe that the proportion of base to height exhibited by the Rule, very closely assimilates with the width of carriage and height of gun (or rather height of centre of gravity) in the Madras Artillery construction.

MINUTE BY MAJOR MAITLAND.

I dissent from the opinion of the Committee.

(Signed) J. MAITLAND, Major.

Madras, 23d May 1856.

ARTICLE 717.

ON THE SUBJECT OF HEATING IRON ORDNANCE TO ASCERTAIN THE EFFECTS OF THE HEAT ON THE BORES AND METAL.

(a) No. 6553, 27th March 1856. The Military Board direct^(a) that the following correspondence, and reports of experiments shewing the successful results obtained by heating a 6 pdr. iron gun, may be submitted to the Select Committee.

(b) dated 18th December 1855. 1. Memorandum^(b) by Lieut. Colonel G. Balfour, accompanied by Memoranda* on the subject of heating iron Ordnance, and recommends an experiment to be tried with an iron gun, to be roasted by the Principal Commissary of Ordnance.

(c) No. 429, 18th February 1856. 2. Letter^(c) from the Principal Commissary of Ordnance to the Secretary Military Board, forwarding a memorandum shewing the result of the experiment with a 6 pdr. iron gun, and the mode in which it was carried on.

Memorandum of the method adopted in heating an iron 6 pdr. gun and the result of the experiments.

A Furnace was prepared for the purpose, the top and bottom of which were old cast iron axletrees laid close enough together to keep the charcoal from falling through at the bottom, and clay at the top, the walls were built of mud with several holes 4 inches square on all sides to allow the air to circulate within, a draught channel was cut under the Furnace for the same purpose, two feet deep, sloped out at both ends and an opening left at each end of the Furnace two feet

wide and one and a half feet deep, for the purpose of allowing the wind to blow through, and seeing the heat of the gun inside, and with these draught holes no bellows were used.

The interior measurement of the Furnace was—length 9 feet 6 inches—depth from roof to bottom 3 feet 6 inches—width 2 feet 6,—the gun was laid in and the Furnace built over it. The fuel was screened charcoal and staves of old tar barrels.

The fire was lighted at 6 A. M. and at $\frac{1}{2}$ past 8 the gun was *a full red heat*.

Damp bratties and moistened paddy husks were then put in and every air hole on every part of the Furnace was stopped up, and the gun left till that day week to cool, when the Furnace was opened and the gun removed.

Previous to heating, the gun had been weighed and the bore measured, on its being taken out and cleaned, it was again weighed and gauged and the result is as follows—

Previous to heating.

Calibre of gun.....	3·65.
	cwt. qrs. lbs.
Weight by weighing.....	21 1 0
Weight marked on the gun.	21 0 7

After heating.

Calibre of gun.....	3·65.
	cwt. qrs. lbs.
Weight by weighing.....	21 0 16.

The discrepancy in the weight may be owing to the scales not being calculated to weigh more than 20 cwt.—Previous to the piece being heated a new file was tried on it but it would not touch it. On the gun being taken out and cleaned, a file was again applied to it, when it cut in the same manner as on wrought iron, and this is the only apparent difference. The gun did not scale in the slightest manner, and the bore is as smooth as it was previous to being placed in the Furnace.

The gauge used for measuring the bore of the gun, was an iron cylinder fixed to a sponge staff and made for the occasion.

(Sd.) P. HAMOND, Col., *Ag. Pricpl. Comy. of Ordnance.*
ARSENAL, FORT ST. GEORGE, 18th February 1856.

[d] dated 26th March 1856. **3. Letter^[d] from Lieut. Colonel P. Anstruther C. B. to the Secretary Military Board,** (with report of an experiment with a 6 pdr. iron gun) of which the following is an extract. •

“ By the Board’s directions, a sponge or rather a rammer was furnished with the gun from the Grand Arsenal, the head of which was stated by the Principal Commissary of Ordnance, to be accurately the diameter of the bore of the gun, it could go down, but no bigger could do so.”

2. “ It did go into the bore, but we were cautious about sending it home, lest it might stick and cause trouble, the gun was then treated as mentioned in Mr. Manning’s paper, and the result is, the rammer head will not enter the gun’s bore.”

3. “ Thus is established the principle for which I have so long contended, that heating does, by expanding the metal diminish the calibre, but to what extent my instruments do not enable me to judge.”

MEMORANDUM.

The 6 pounder gun received from the Arsenal was coated with the following :—

Cow dung.....1 part	} These were well mixed together and formed a paste.
Clay .....1 „	
Lime.....1 „	

It was then applied to the gun and allowed to dry ; two more coats were added until the coating was about half the thickness of the metal.

The gauge of the gun previous to heating.

Calibre 3·65 or 3·668.

We have no means of measuring.

The gun was laid on a grating of iron, covered over with bratties and wood, the fire being increased until the gun was brought to a blood red heat ; the fire was then allowed to go out, and the gun left to cool for six days.

The metal before it was submitted to the fire was quite hard,, and a file and graver made no impression on it ; after

annealing, the gun was quite soft, so that it could be cut or filed.

(Signed) W. MANNING, *Sub Condr. of Ordnance.*

(Signed) P. ANSTRUTHER, *Lieut. Col., Arty.*

GUNPOWDER MANUFACTORY, }
26th March 1856.

OPINION.—The Committee recommend that the bore of the gun be very carefully examined and measured, and the change in dimensions accurately noted. They also suggest that the metal be tested to ascertain what changes may have taken place in structure and density, and that the gun be subjected to a severe proof.

2. Before entering on the above subjects the Committee further suggest that the gun heated in the Arsenal without exhibiting any subsequent change in its dimensions, be again exposed to a high temperature, say 2000° Fahrenheit, with the purpose of ascertaining whether any, and what expansion will then take place.

MINUTE BY MAJOR W. K. WORSTER.

The 6 pdr. gun which has been heated and annealed at the Arsenal, appears to have undergone little or no change by the process, either in dimensions or weight, but its texture is altered considerably, being no longer hard and intractable under the file, and in fact is not in the condition of hard cast iron as it came from the founder. Whether the new molecular arrangement is likely to be prejudicial to its strength to resist rupture, or the bore from being softened is liable to be scored by the shot, must be left for experiment to determine. Should the metal not be weakened by the process, the latter can probably be obviated by filling the bore with carbonaceous matter and again heating and annealing the gun, when the bore will become case-hardened in some degree and perhaps with a greater chance of decrease in diameter.

The gun heated with a composition at the powder mills is declared to have become diminished in the bore as tested with a turned cylinder. This cylinder however was the identical

gauge used by the Principal Commissary of Ordnance, and does not appear to have been re-turned at the mills, but merely inserted in the gun, and considered to be sufficiently accurate. In so delicate an enquiry it should not be taken for granted that this diminution has taken place from this examination alone, oxidation may have taken place also ;—the gun should be well cleaned and scaled for re-examination, in fact every precaution should be taken to prevent erroneous conclusions.

If the iron is really strengthened, the weight of metal may be reduced, but Artillerymen would hesitate in sanctioning reduction of the parts of a gun *of iron* of which there must always be some doubt as to its ultimate strength to resist rupture.

It appears to me however that after all, the process should be merely looked upon as an experiment of some interest only, as shewing the modification cast iron undergoes when subjected to slow cooling, and can scarcely be considered of any advantage to the service, even if all the anticipated effects are realized, as it will scarcely be worth while to subject a large number of guns to such treatment, when they could be re-cast *within* the usual limits with probably the same amount, or *but little more* of fuel, required for the annealing. I think also, that no innovation in so delicate a matter should be permitted without the severest test of experiment, and at this moment with the conflicting opinions of scientific men as regards the supposed advantages of annealing, I doubt if we are justified in continuing experiments until the two guns are subjected to the severest proof and subsequent *fracture*, to ascertain whether the change has been beneficial.

There is one point of importance which must not be lost sight of in considering this question,—the liability to oxidation, especially of flaws, which would inevitably become larger and in some instances would condemn the gun ;—If therefore, at any time, an Officer is anxious to reduce his

windage, he should be warned that a most scrupulous examination should be made before he submits the gun to the annealing process, lest he should risk all that he desires to secure.

MADRAS, 23d May 1856. (Sd.) W. K. WORSTER, Major.

ARTICLE 718.

ON AN EXPERIMENTAL LIMBER FOR ALL HEAVY FIELD GUNS AND HOWITZERS.

The Military Board direct that the question regarding the pattern of Heavy Field Limbers may be decided on.

Former Proceedings^[a] of the Select Committee and the undermentioned documents are laid before them.

[a] Meeting 169, Article 710, 9th February 1856, page 478, in Artillery Records.

[b] No. 6282, 8th March 1866.

1. *Extract from the Proceedings of the Military Board*^[b].—Forwards copy of the above Proceedings^[a] to the Superintendent Gun Carriage Manufactory, with a request to prepare a Limber in accordance with the suggestion of the Committee.

[c] No. 7131, 28th April 1856.

2. *Letter*^[c] *from the Secretary Military Board to the Superintendent Gun Carriage Manufactory*.—Directs the construction of Heavy Field Limbers to be stopped, until the question of the pattern is decided.

OPINION.—The Committee after careful investigation consider it impracticable to construct a limber equally well adapted for the 8 and 10 inch Howitzer Carriages and Heavy Field Gun Carriages, they therefore recommend that the Heavy Field Gun Limber of the present pattern be established, which is of a similar construction to that obtaining in Bengal.

2. The Committee further recommend that the Bengal 8 and 10 inch Howitzer Limber, *omitting the rear framing*, be the established pattern at Madras.

DECISION.—Pattern Limbers to be prepared and submitted for the final decision of the Select Committee.

Extract from Military Board's Proceedings No. 632, dated 28th May 1856.

ARTICLE 719.

ON STRENGTHENING THE CARBINE BOXES ATTACHED TO THE REAR OF AMMUNITION WAGGONS.

The Military Board direct^[a] that the undermentioned correspondence on the subject of increasing the thickness of the planks of carbine boxes be laid before the Select Committee for consideration.

[a] Extract Proceedings
Military Board No. 185,
7th May 1856.

1. *Letter*^[b] *from Captain J. L. Barrow Commissary of Ordnance H. S. Force to the Secretary Military Board.*—Brings to notice that a Carbine box was returned to him for repair, with a report as to the weakness of the framing, one side having split from end to end going over ground which occasioned very little jolting, and would wish to be informed if the Board is not of opinion, that the sides of the boxes might be advantageously made of thicker planking.

[b] No. 30, 19th February 1856.

2. *Letter*^[c] *from the Superintendent of the Gun Carriage Manufactory to the Secretary Military Board.*—Is also of opinion that the sides should be thicker, the front and rear planks being $\frac{3}{4}$ inch thick, instead of $\frac{1}{2}$ inch,—in short, all the planks of one uniform thickness.

[c] No. 270, 5th May 1856.

OPINION.—The Committee adopt the suggestion made by Captain Barrow Commissary of Ordnance Secunderabad, and concurred in by the Superintendent of the Gun Carriage Manufactory, that the dimensions of the planking of the Carbine boxes be increased to $\frac{3}{4}$ inch all round.

DECISION.—That the Superintendent Gun Carriage Manufactory will favor the Board with a Memo. of the alterations to be made in boxes already made, and at Out Station Arsenals, to enable Ordnance Officers to alter the boxes.

Extract from the Proceedings of the Military Board No. 611, dated 28th May 1856.

All Waggon's at Artillery Head Quarters to be sent down to the Manufactory to be altered.

MEETING 191.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL A. SHIRREFF, BRIGADIER COMMANDANT OF ARTILLERY.*Artillery Depot Saint Thomas' Mount 31st July 1856.***PRESENT.**

COLONEL P. HAMOND, *Principal Commissary of Ordnance.*
 LIEUT. COL. P. J. BEGBIE, *Commanding 5th Battalion Artillery.*
 MAJOR T. K. WHISTLER, *Commanding 2d Battalion Artillery.*
 MAJOR G. W. Y. SIMPSON, *Superintendent Gun Powder Manufactory.*
 MAJOR G. BRIGGS, *Acting Assistant Adjutant General of Artillery.*
 MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 CAPTAIN G. DANCER, *Acting Adjutant 5th Battalion Artillery.*
 LIEUTENANT J. W. F. TAYLOR, *2d Battalion Artillery.*

ARTICLE 720.**ON A PLATFORM AND CARRIAGE FOR A 56 AND 68 PDR. GUN.**

A Platform and Carriage for a 56 and 68 Pdr. Gun, received from England, directed by the Military Board ^(a) to be submitted to the Select Committee for examination and report.

^(a) Extract from Proceedings No. 827, 4th June 1856.

The following documents are laid before the Committee.

1 Letter ^(b) from the Principal Commissary of Ordnance to the Secretary Military Board.—Reporting arrival from England of a Traversing Platform and Carriage with handspikes, for a 56 or 68 Pdr. Gun, varying in certain particulars specified, from those in use.

^(b) No. 1186 2d June 1856.

2 Letter ^(c) from the Superintendent Gun Carriage Manufactory to the Secretary Military Board.—Reports having examined the new

^(c) No. 286 8th July 1856.

Traversing Platform and Carriage for 56 or 68 Pdr. Gun and the differences between them and the former 56 or 68 Pdr. Traversing Platforms &c., with suggestions as to the alteration of existing patterns in use and disposal of Half wroughts in store.

(d) No. 393 10th July 1856. **3 Letter ^(d) from the Superintendent Gun Carriage Manufactory to the Director Artillery Depot.**—Forwards copy of the above Report to the Military Board No. 386.^(c)

(e) No. 1584 10th July 1856. **4 Extract from the Proceedings of the Military Board ^(e).**—Requests the Superintendent Gun Carriage Manufactory to send up the new Carriage to Artillery Head Quarters; authorizes a new carriage to be made up strictly according to the new pattern, and when ready to be sent to Artillery Head Quarters with one carriage of the old pattern, and the old and new pattern carriages to be proved in presence of the Artillery Select Committee.

(f) No. 1815 24th July 1856. **5 Extract from the Proceedings of the Military Board ^(f).**—Submitting for the Artillery Select Committee's decision, a representation ^(g) from the Superintendent Gun Carriage Manufactory, of the absolute necessity of having the new 68 Pdr. Carriages fitted with Trunnion and Garnish Plates &c.

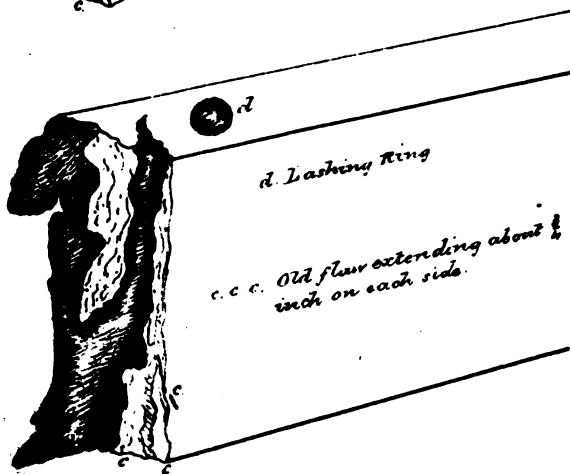
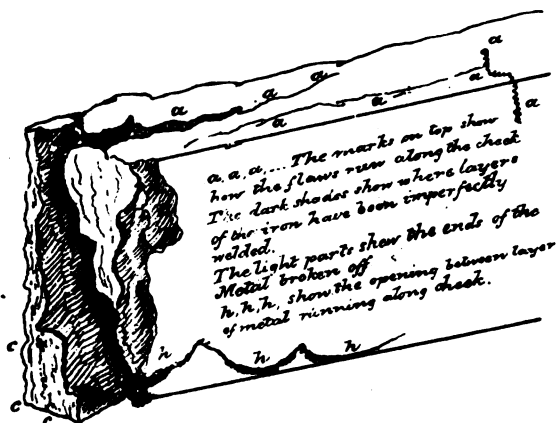
OPINION.—The English Carriage and Platform being found to be constructed of Teak, the Committee suggest that it be sent to the Mount and tested (by firing and exposure) with one of the old 56 Pdr. Carriages made at the Gun Carriage Manufactory.

• Extract Progs. Mily. Board No. 2111 11th Augt. 1856.
 Letter of Comt. of Arty. No. 327 14th " "
 Extract Progs. Mily. Board No. 2225 18th " "
 Letter of Supt. G. C. Many. No. 524 21st " "
 Extract Progs. Mily. Board No. 2365 22d " "
 Letter of Comt. of Arty. No. 359 6th Sept. " "
 Extract Progs. Mily. Board No. 2787 9th " "

* Further correspondence between the Military Board, the Commandant of

Artillery Select Committee Meeting 191 Article 721

Sketch of the fracture of the Cheek of the Iron 8 Inch Howitzer Carriage



Artillery, and the Superintendent Gun Carriage Manufactory, on the most desirable mode of testing the Carriages, resulted in the decision by the Board, that one of the Carriages of the present pattern and one of the English pattern, but of the Gun Carriage Manufactory materials and manufacture should be exposed for a continuance on the works of Fort Saint George, to the alternate roasting and drenching they there experience, and afterwards be sent to the Mount for Proof by firing.

ARTICLE 721.

ON THE FRACTURE OF THE CHEEK OF THE IRON 8 INCH HOWITZER CARRIAGE, REFERRED TO IN MEETINGS 186 AND 187, ARTICLES 698 AND 705.*

The following documents are laid before the Committee.

(a) No. 378, 10th June 1856. 1. *Letter^(a) from Captain T. H. Campbell Commissary of Ordnance Bangalore, to the Secretary Military Board*:—Reporting discovery of crack in left cheek of Iron 8 inch Howitzer Carriage, which opened on being struck with a sledge hammer, and required to be broken to be repaired; and forwarding sketch of fracture (Plate 98), shewing flaw, with remarks on its imperfect welding.

(b) No. 1019, 12th June 1856. 2. *Extract from the Proceedings of the Military Board^(b)*.—Forwards copy of the above to be laid before the Artillery Select Committee, in continuation of the former Reports connected with the welding of iron, and requests the Committee to propose some tests, by which the welding of the larger wrought iron pieces made at the Gun Carriage Manufactory may be proved.

OPINION.—As the Nasmyth Steam Hammer is shortly to be brought into use, the Committee do not anticipate that there will be then any difficulty in welding heavy iron work or any likelihood of failure in doing so, they do not, therefore, at present propose any tests for iron work, but suggest

* Pages 434 and 456 in Artillery Records.

that Captain T. H. Campbell may be directed to repair the broken cheek, and to report in detail everything connected with his mode of doing so. The Committee recognize the great practical value of information of this nature, tending to give confidence to Regimental Officers in circumstances of difficulty.

(e) No. 2665, 4th September 1856.

(f) No. 350, 20th August 1856.

DECISION.—The Military Board in Extract from their Proceedings^(e), forward copy of a letter^(f) from W. B. Wright Esquire Locomotive Superintendent, to Major T. A. Jenkins Agent and Manager Madras Railway, on the application of Nasmyth's Steam Hammer in welding masses of iron &c. &c. of which the following is an extract,

"I have no hesitation in stating that for large works of the description specified, that the Steam Hammer, if properly worked, is the best appliance that can be used for the purpose of ensuring sound forgings, and that there is much greater risk of heavy work being unsound when forged by means of hand hammering, than when forged under the Steam Hammer. It is usual and necessary to finish off work from the Steam Hammer by means of hand hammering."

ARTICLE 722.

GREASE FOR LUBRICATING THE AXLES OF GUN CARRIAGES.

(a) No. 1372, 25th June 1856.

The Principal Commissary of Ordnance in letter^(a) to the Director Artillery Depot, forwards a specimen of Grease for lubricating the axles of Gun Carriages; submitted for the opinion of the Select Committee by order of the Brigadier Commandant of Artillery.

The Grease was submitted to the following practical test.

The wheels of a Hack Palankeen Carriage with patent axles were carefully cleaned, and 2 ozs. of ordinary grease,—

such as is generally used for lubricating the wheels of Ordnance Carriages, applied to each of the *right* wheels, and the same quantity of Monsieur Loire's composition, to each of the *left* wheels; it was then run for nearly a month, and a Register kept of distance travelled during that period, amounting to about 300 miles;—after which, the wheels were taken off and axles examined in presence of the Committee.

OPINION.—The Carriage having been run nearly a month, and the distance travelling about 300 miles, the wheels greased with Monsieur Loire's mixture do not appear to be in such good order as those on which common grease has been applied; *that* in the former having entirely disappeared, while the latter has still a good supply adhering to it.—The Committee see no ground therefore on which to recommend Monsieur Loire's in preference to the common grease.

Extract from the Proceedings of the Military Board No. 2435, dated 15th August 1856.

DECISION.—The Military Board suggest, that the guns belonging to the two Batteries at the Mount be greased with Monsieur Loire's grease for one month, and a report made after that term.

ARTICLE 723.

ON A MOVEABLE KIND OF SEAT FOR THE MEN WHO RIDE ON THE LIMBER OF LIGHT FIELD CARRIAGES.

(a) Meeting 187, Article 703, page 454, in Artillery Records.
Meeting 190, Article 714, page 464, in Artillery Records.

In continuation of former Meetings^(a) this subject is again laid before the Committee with the undermentioned correspondence, by order of the Brigadier Commandant of Artillery.

1. Letter^(b) from the Superintendent of the Gun Carriage Manufactory to the Di-

(b) No. 364, 2d July 1856.

rector Artillery Depot.—Forwards a muster seat received from the Officer Commanding Horse Brigade.

OPINION.—The moveable seat now submitted to be adopted.

ARTICLE 724.

ON THE EXPEDIENCY OF ADOPTING THE CARBINE BOXES ATTACHED TO THE REAR OF AMMUNITION WAGGONS.

The Military Board direct^(a) the under-mentioned documents relative to the expediency of having Carbine Boxes attached to the rear of Ammunition Waggon, being submitted to the Select Committee, with the view to an early decision being come to.

(a) Extract from Proceedings No. 2033, 5th August 1856.

1. *Extract from the Proceedings of the Military Board*^(b).—Forward sketch showing the alterations to be made to the Carbine boxes attached to the rear of Ammunition Waggon, and requests the attention of the Brigadier Commandant of Artillery to the 4th volume of the Bombay Proceedings, by which, it appears, that the use of the Carbine box is not introduced into the Bombay Artillery.

(b) No. 254, 30th June 1856.

2. *Letter*^(c) *from the Brigadier Commandant of Artillery to the Secretary Military Board.*—Concurs “fully in the force and propriety of the grounds of objection to the adoption of the Carbine box, set forth in the Proceedings of the Bombay Select Committee; considering, unquestionably, that the proper use, and intention, of the allotment, of 18 Carbines to Batteries, whose Personnel is armed only with swords, both on the march, and in camp, is for the guards and foraging parties, and that to stow them away in boxes, in rear of the Waggon is altogether a mistake.”

Conceives “that if the Madras, and Bombay Artilleries,

“concur in objecting to the box, ordered at the suggestion
 “of the Bengal Artillery alone, without any reference to the
 “other Presidencies, and which we have found in practice, to
 “be inconvenient from its position, and injurious to our
 “Waggons, then urgent and valid reasons are thereby estab-
 “lished for a revision of the question, which might with pro-
 “priety be submitted for the sanction of the Government.”

[^d] No. 1426 5th July 1856. 3. *Letter^[d] from the Secretary Military Board to the Inspector General of Ordnance*

Bengal.—Brings to notice, in reference to the suspension of the adoption of the Carbine box on the Waggons, in vol. IV Proceedings Artillery Select Committee in the Bombay Presidency, the very strongly and clearly set forth objections to it by the Brigadier Commandant of the Madras Artillery, and expresses “that alterations in the equipment of the Ar-
 “tillery of India are not submitted for the consideration of
 “the three Artilleries, as in this instance, where a box is or-
 “dered to be put on our Waggons for a purpose not admit-
 “ted to be necessary by the Artilleries of Madras and Bom-
 “bay.”

[^e] No. 2027, 18th July 1856. 4. *Letter^[e] from the Inspector General of Ordnance Bengal to the Secretary Military Board Madras.*

—States that the order, regarding boxes for the carriage of Carbines upon the Waggons “was given
 “by Government in 1853, at the recommendation of the
 “Permanent Select Committee, and of the late Military
 “Board.”

Concurs in considering “the boxes to be totally useless,
 “and a mere incumbrance to the Horse Artillery of the
 “Madras and Bombay Presidencies, as their detachments
 “could carry such carbines as might not be in use with guards.”

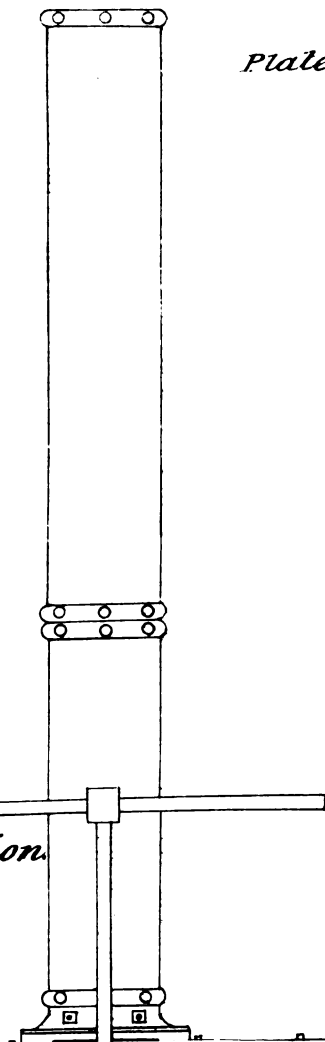
Believes that since he has been in office “every proposed al-
 “teration of any importance has been submitted for the opi-
 “nion of the Regiments of Artillery at Madras and Bombay.”

OPINION.— The Committee concur fully in the objections to the Box for Carbines at the rear of the ammunition Waggon stated in page 59, Vol IV, of the published Proceedings of the Bombay Artillery Select Committee, one of which, referring to their effect on the solidity and overweighting of our Carriages, has been proved by experience in the fracture of Madras Waggon so equipped, and consider that the placing these Arms in Boxes on the Waggon instead of in the hands of Advanced, Rear, and Camp Guards, and Foraging parties, is opposed to the primary object of their provision. Any surplus Arms may be strapped to the Limber Ammunition Boxes as in the Royal Artillery Equipment, and as the whole of them would be when the Battery is in Action.

DECISION.—The Military Board in their Circular Order No. LXII of 28th October 1856 direct, that the Carbine Boxes be removed from all Carriages, and discontinued.

hot

Acceleration.



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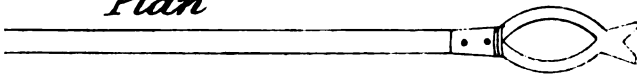
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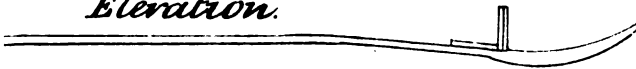
Shot

*for lifting the Shot
and out of the Furnace.*

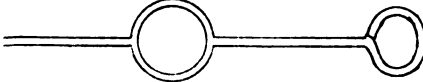
Plan



Elevation.



*Carrier:
Plan.*



*Shot for guiding the Shot
on to the lifting tool.*

Plan



MEETING 192.

**EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT
COMMITTEE, ASSEMBLED BY ORDER OF COLONEL A. SHIRREE, BRI-**

MEMORANDUM.

A limited number of the following work, published since the close of the late war, and just received from England very neatly bound in Scarlet cloth, can be procured on application to the Director Artillery Depot at Rupees 2-12-0 per copy, or Rupees 2-14-0 if sent by Bhangy post.

“Illustrated Handbook of Military Engineering and of the Implements of War. Designed with a view to Illustrate, and render intelligible to Non professional readers, the various necessary Technical expressions found in all Historical or popular descriptions of modern warfare.”

By R. FORREST

Woolwich.

the Military Board, submitted for the report of the Select Committee.

The undermentioned documents on the subject are laid before the Committee.

- (a) No. 226, 26th January 1896. 1. *Letter (a) from the Principal Commissary of Ordnance to the Secretary Military Board.*—Reporting on the efficiency of the Furnace which

MEETING 192.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL A. SHIRREFF, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot Saint Thomas' Mount, 25th Nov. 1856.

PRESENT.

COLONEL P. HAMOND, *Principal Commissary of Ordnance.*

COLONEL P. J. BEGBIE, *Commanding 5th Battalion Artillery.*

MAJOR G. W. Y. SIMPSON, *Superintendent Gun Powder Manufactory.*

MAJOR G. BRIGGS, *Acting Assistant Adjutant General of Artillery.*

MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*

MAJOR G. ROWLANDSON, *Director Artillery Depot.*

LIEUTENANT H. G. BISHOP, *Quarter Master 5th Battalion Artillery.*

LIEUTENANT G. B. PRIOR, *Adjutant 5th Battalion Artillery.*

LIEUTENANT R. A. PEACH, *2d Battalion Artillery.*

ARTICLE 725.

**ON A PORTABLE IRON FURNACE FOR HEATING SHOT.
PLATES 99 AND 100.**

Experiments were made in February 1856, with a Portable Iron Furnace for heating shot, supplied by the Porto Novo Iron Company, and it was recommended that an additional door should be made at the end opposite the present one, previous to its being submitted to the Select Committee:—The Furnace having been sent to Artillery Head Quarters, with the alterations made as suggested, it is now, by order of the Military Board, submitted for the report of the Select Committee.

The undermentioned documents on the subject are laid before the Committee.

- (a) No. 226, 26th January 1856. 1. *Letter (a), from the Principal Commissary of Ordnance to the Secretary Military Board.*—Reporting on the efficiency of the Furnace which

had been tested in the manner described in Experiment No. 3.

(b) No. 5655, 30th January 1856. *2. Extract (b) from the Proceedings of the Military Board.*—Forwarding the above report to the Major General Commandant of Artillery, and requesting that the Furnace may be tried at Artillery Head Quarters and reported on by the Artillery Select Committee, and description of furnace with reports of experiments printed in the Records.

[c] No 105, 21st February 1856. *3. Letter [c] from the Commandant of Artillery to the Secretary Military Board.*—Forwarding Report of Experiments with the Portable Iron Furnace on the 18th February 1856, (d) with a copy of former Experiments made in February 1854, (e) and suggests that the addition of a door, to admit of fresh shot being added, as therein recommended, be made previous to submitting the subject to the Permanent Artillery Select Committee.

1st Experiment made at Artillery Head Quarters in March 1849, with the Portable Iron Furnace for heating shot as directed in Military Board's letter No 325, dated 23d February 1849.

1st Trial. The Portable Shot Furnace was charged on the 2nd of March with the ordinary country fuel, viz. charcoal, bratties, and firewood. The fire was lighted and allowed to burn 30 minutes.

Fifteen 32 Pdr. shot were then put in, they remained one hour and a half without becoming serviceably hot; fresh fuel was added every successive hour for three hours. After the shot had been in the Furnace $4\frac{1}{2}$ hours, on examination none of them were sufficiently hot for service. The fuel at the lower part of the furnace burnt rapidly away and sunk before the upper part was thoroughly ignited, consequently, the fire did not come in contact with the shot which was supported on the Iron Bars above it.

During Hot Shot Practice at Artillery Head Quarters in

1849 with the ordinary furnace and country fuel viz. brat-ties and wood only, the fire was lighted at 4 o'clock A. M. and the shot became thoroughly heated and ready for use by 6 o'clock.

TRIAL. The Furnace was charged on the 3d of March with wood and $2\frac{1}{2}$ bushels of sea coal, the fire was lighted at $\frac{1}{2}$ past 11 and allowed to burn 30 minutes. At noon fifteen 32 Pdr. shot were put in, and fuel added when required until 3 o'clock; at $\frac{1}{2}$ past 3 the shot were taken from the Furnace, when the whole were serviceably hot, but none red hot. The use of coke appears indispensable; that article of fuel does not consume so rapidly as coal and the fire is kept in close proximity to the shot.

When using sea coal only, the fuel at the lower part of the Furnace is consumed before that at the upper part is properly ignited, the whole mass sinks and leaves the shot untouched by the coal, and when adding fresh fuel, the shot for a while is deprived of the heat proceeding from the coal, which has already ignited. The quantity of coal used was 4 bushels.

ARTILLERY DEPOT, }
ST THOMAS' MOUNT, }
9th March 1849. }

(Signed) A. F. OAKES, Captain,
Director Artillery Depot.

2d Experiment made at Artillery Head Quarters in 1854 as directed in Military Board's letter No. 5091, dated 9th December 1853.

The furnace was used during the Annual Artillery Practice at Head Quarters in 1854 for four days, with sea coal and charcoal for fuel. It was charged with a small quantity of shavings and wood, with 21 lbs. of sea coal and $\frac{1}{4}$ parah of charcoal. The fire was lighted at $\frac{1}{2}$ past 4 o'clock A. M. and allowed to burn 20 minutes, during which time 30 lbs. of sea coal and $\frac{1}{4}$ parah of charcoal were added; six 32 Pdr., six 24 Pdr., and six 12 Pdr. shot were then put in, which became serviceably hot in 40 minutes, and red hot in 55 minutes.

Care must be taken in using this Furnace, not to add too much fuel at a time; in tending the fire, attention should likewise be given not to allow the fire to get too low. Little variation took place on each day the Furnace was used, in the quantity of fuel consumed, and the time occupied in making the shot serviceably hot, and red hot. In the second day's trial fresh shot were introduced after the first quantity had been taken out; the fire having been mended with 26 lbs. of sea coal, and $\frac{1}{2}$ a parah of charcoal. In 25 minutes, 5-32 Pdr., 5-24 Pdr., and 5-12 Pdr. shot were serviceably hot. They were then taken out, and the same number of cold shot put in, without adding more fuel, which became red hot in half an hour. After the furnace has been thoroughly heated, a constant supply of hot shot could be kept up without trouble. The addition of a door, at the end opposite the present door to admit of fresh shot being put into the Furnace as the heated ones are withdrawn, would be a very great improvement.

ARTILLERY DEPOT, } (Signed) G. W. Y. SIMPSON Major,
17th February 1854. } *Director Artillery Depot.*

(Signed) F. BLUNDELL, Brigadier,
Commandant of Artillery.

3d Experiment made at the Arsenal of Fort St. George in January 1856 as directed in Extract from Military Board's Proceedings No 4719, dated 8th December 1855.

FIRST.—One parah of sea borne coal with a few shavings were placed in the Furnace, and eighteen 18 Pdr. shot put in, which became red hot in three hours from the time the fire was lighted.

SECOND.—One parah of screened charcoal with a few shavings were placed in the Furnace, and allowed to burn for a short time previous to the shot being put in, and they became red hot in 30 minutes.

THIRD.—Before the fire was extinguished, a fresh batch of shot were put in the Furnace, and billets of firewood used, the

shot became hot in 45 minutes:—2 maunds of firewood were expended.

FOURTH.—The fire not being extinguished, another supply of shot were put in the Furnace and bratties used, the shot became hot in 75 minutes.

One charge of Europe coal or charcoal, was found sufficient to heat the shot, but when wood or bratties were used, some of the shot had to be taken out several times to admit of additional fuel being added to the fire.

The furnace although not so well made and finished as the one received from England, as stated in my letter No, 1825, dated 5th September 1855, is found to answer the purpose for which it is intended.

ARSENAL FORT ST. GEORGE, } (Sd.) P. HAMOND, Colonel,
26th January 1856. } *Act. Prinl. Com. of Ordnance.*

4th Experiment made at Artillery Head Quarters on the 18th February 1856, as directed in Extract from the Board's Proceedings No 5655, dated 30th January 1856.

The Portable Furnace for heating shot with a supply of fuel having been received from the Grand Arsenal, the following experiments were made under the superintendence of Sub Conductor Crew, who had been detailed for that purpose with a party of Lascars.

1st.—The Furnace was charged with 14 lbs. of wood and 28 lbs. of sea coal. Eighteen 18 Pdr. shot were placed on the bars, and the fire lighted; in one hour, during which time 14 lbs. of sea coal were added at intervals, the whole of the shot became serviceably hot.

2d.—Fourteen lbs. of charcoal were then thrown into the Furnace and 18 fresh shot (18 Pdr.) placed on the bars. In 55 minutes the whole became serviceably hot, 14 lbs. of charcoal having been added at intervals.

3d.—The Furnace at this time was very hot, 47 lbs. of billets of wood only were placed on the embers of the fire, and

eighteen fresh shot became serviceably hot in 40 minutes, without additional fuel.

ARTILLERY DEPOT, } (Signed) G. W. Y. SIMPSON, Major,
21st February 1856. } *Director Artillery Depot.*

(Sd.) F. BLUNDELL, Major Genl.,
Commandant of Artillery.

OPINION.—The Furnace having been fully tested as shewn in the Reports recorded in these Proceedings, and the improvements suggested having been made, the Committee consider the Furnace well adapted for the service in India, and recommend its adoption.

ARTICLE 726.

DOCUMENTS SELECTED BY CAPTAIN C. H. HUTCHINSON FROM THE RECORDS OF THE SELECT COMMITTEE OF ARTILLERY OFFICERS AT WOOLWICH.

(a) Extract from Proceedings No 2164, 12th August 1856.

The Military Board forward (a) copies of Plans, Practice Reports, and other Documents, selected by Captain C. H. Hutchinson of the Artillery, from the Records of the Select Committee of Artillery Officers at Woolwich, for submission to the Permanent Artillery Select Committee, with a suggestion that they should be printed and the Drawings lithographed.

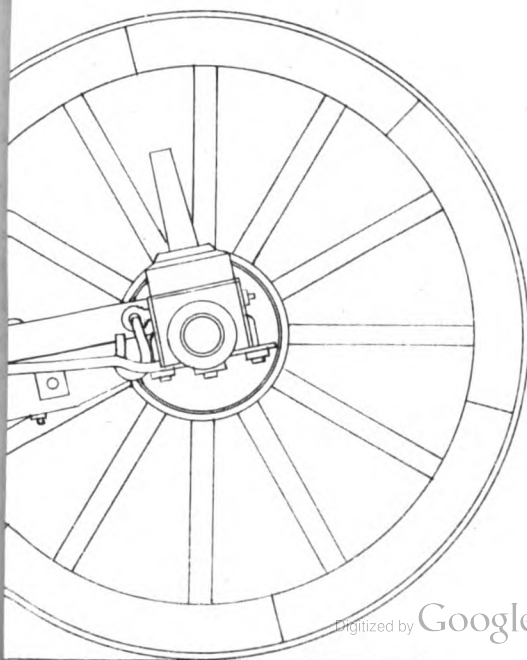
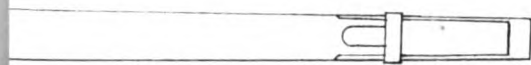
OPINION.—The Committee cordially adopt the suggestion of the Military Board, that these interesting papers should be printed, and the Drawings lithographed, and recommend that application be made for a supply of the diaphragm shells, and other improvements which have been introduced into the Royal Artillery Service.

Extract from the Proceedings of the Military Board No 5164, 12th December 1856.

DECISION.—Printed copies of the above, together with a report from the Select Committee to be sent to the Board.*

* The Papers and Plans are being published in the Artillery Records, and will when completed, form a separate Pamphlet entitled "PAPERS FROM WOOLWICH &c."

er Carriages.



ARTICLE 727.

ON ESTABLISHING A PATTERN LIMBER FOR ALL 8 AND 10 INCH HOWITZERS. PLATE 101.

The Military Board direct ^(a) that a 10 Inch Howitzer Limber, which has been altered according to the suggestion of the Select Committee, ^(b) may be again reported upon by them.

(a) Letter to the Brigadier Commandant of Artillery No 2881, 13th September 1856.

(b) Meeting 190, Article 718, page 495, Artillery Records.

OPINION.—The Committee recommend with reference to their Report at the last Meeting on this subject, ^(c) that the Limber as now submitted, be the established Limber for the 8 and 10 Inch Wooden Howitzer Carriages.

(c) No. 5179, 12th Dec. 1854.

DECISION.—The pattern now passed, approved of, vide Extract from Military Board's Proceedings ^(d)

ARTICLE 728.

PROPOSITIONS FOR PLACING LASHING EYE STAPLES ON THE LASHING BARS OF GUN AND WAGGON LIMBERS, FOR SECURING THE AMMUNITION BOXES, AND FIXING THE HURTER CLAMPS BY RIVETTING INSTEAD OF SCREWS,—BY MAJOR J. E. MAWDSLEY.

The following Documents are laid before the Committee.

1. *Letter* ^(a) *from Major J. E. Mawdsley Commanding D. Troop Horse Artillery, to the Director Artillery Depot.*—Represents that the Limber Boxes in his opinion are very insecure, unless lashed by the Limbering handles to the Lashing bar :—and suggests having Rings or Staples fixed for the purpose to Lashing bar :—also suggests the propriety of having the Hurter clamps rivetted on, instead of being fastened with screws, as they frequently become loose, and the lashing in the rear of the box gives way.

OPINION.—The Committee do not recommend lashing the Ammunition Boxes, as proposed by Major Mawdsley, but as

an additional security, approve of the hurter clamps being fastened with rivets instead of screws, and with the same view, recommend the addition of a small pin (as was formerly the case) to pass through the hurter, to prevent the Box falling off, in the possible event of the rear lashing getting loose.

Extract from the Proceedings of the Military Board No 5175, 12th Dec 1856.

DECISION.—The Board authorize the alterations as recommended, and to be in use with Major Mawdsley's Troop for one year, to be then reported upon to Artillery Head Quarters, and finally decided upon by the Select Committee.

ARTICLE 729.

ON THE METHOD OF SECURING TIN COLLARS &c. TO SHOT AND SHELL.

(a) Extract from the Proceedings of the Military Board No. 2168, 24th September 1856.

The Military Board forward ^(a) documents received from the Inspector General of Ordnance Bengal, relative to the comparative efficiency of tin collars and grummets for shot and shell, and the modes of fixing them.

The undermentioned correspondence is laid before the Committee.

(b) No. 286, 18th July 1856.

1. *Letter ^(b) from the Brigadier Commandant of Artillery to the Secretary Military Board.*—Forwarding Reports from the Officers Commanding 2nd, and 5th Battalions Artillery, on the subject of shot and shells with grummets and tin collars, and conceives that, “whatever imperfections attach to the tin collars, or “whatever superiority the grummets may be supposed to “possess over them, the latter, as far as relates to shells, can “no longer be retained, as in consequence of the increased “gauge of the new shells, the windage is so much diminished, that the shells with grummets, after a very few rounds, “will not enter the piece, and on a recent occasion, it was “found necessary to cut them off before loading”:—Considers further trials superfluous, and the only point now to be looked to, is whether a surer mode of attaching the collars can be

devised to prevent their liability to be shaken off in travelling.

(c) No. 3365, Fort William 6th September 1856.

2. *Letter (c) from the Inspector General of Ordnance Bengal, to the Secretary Military Board Madras.*—Forwarding copy of letter from the Secretary to the Permanent Select Committee of Bengal Artillery Officers, in which the Committee express their opinion, that if any change were introduced, they would be glad to revert to tin collars, or bottoms attached to the projectile by straps of tin; that collars are preferable for shell to grummets:—Suggest that a certain number of shells of different sizes (those of the highest gauge being selected) may be fitted with tin collars attached by all three methods, namely, by straps of tin, straps of sheep skin, and by cement, and carefully tested at Meerut under their supervision during the ensuing Practice season.

They are also desired to carry on experiments as to the comparative efficiency of tin collars and grummets, and the modes of fixing them for shot; and with this view they recommend that a sufficient number of each nature of the highest gauge may be fitted accordingly next Practice season.

OPINION.—The Committee recommend that a sufficient number of shells be prepared in the several methods proposed, with selected highest gauge projectiles, for experiment at the ensuing Practice. They are however very doubtful of tin straps or sheep skin being found to answer with the present very high gauge of projectiles; and considering the tin collars liable to serious objections, will be glad to include in the Experiment, any suggestions that may be made, from any quarter, likely to meet this important necessity.

ARTICLE 730.

ON A REVISION OF THE ALLOTMENT OF THE MOUNTAIN TRAIN.

The following documents on the subject are laid before the Committee.

- (a) No. 245, 15th June 1856. 1. *Letter^(a) from the Brigadier Com-mandant of Artillery to the Secretary Military Board.*—Submitting an allotment of Mountain Train Ordnance for the Field Train and out station Arsenals of the Madras Presidency.
- (b) No. 1165, 19th June 1856. 2. *Extract^(b) from the Proceedings of the Military Board.*—Proposing a revision of the Memorandum prepared by the late Major Oakes, with addition of Practice Tables and other useful information connected with Mountain Train pieces, and then to re-print the work for circulation.
- (c) No. 497, 13th August 1856. 3. *Letter^(c) from the Superintendent Gun Carriage Manufactory to the Director Artillery Depot.*—Forwarding Drawings and Statements of weights of component parts of Mountain Train Carriages and Beds.
- (d) No. 2159, 20th Sept. 1856. 4. *Letter^(d) from the Principal Commissary of Ordnance to the Director Artillery Depot.*—Forwards a Memorandum of Ammunition, and mode of carrying it, he would propose for the Mountain Train pieces.
- (e) Dated 17th July 1854. 5 Ranges^(e) of Mountain Train Ordnance.

OPINION.—The Committee suggest that this subject be carried out in detail by a Sub-Committee composed of the following Members, and their Proceedings submitted for the consideration of the Committee ; as soon as ready, with a view to final determination.

Colonel P. J. BEGBIE.

Major G. BRIGGS.

Major G. ROWLANDSON.

DECISION.—The Board approve of the above decision.

Extract from the Proceedings of the Military Board No. 5170, 12th December 1856.

ARTICLE 731.

ON SUGGESTED ALTERATIONS IN THE MODE OF MARKING
TANGENT SCALES.

[a] Extract from Proceedings, No 3698, 16th October 1856.

The Military Board forward^[a] printed copies of Extracts and Letters from Bengal relative to a set of Tangent Scales for Field Pieces forwarded for approval, and suggesting alterations in the mode of marking the same; having engraved on them, in addition to the degrees, half degrees, and quarter degrees at present shewn, the ranges in yards for round shot, and ranges and lengths of fuzes for other description of ammunition, for report by the Select Committee.

The undermentioned documents are also laid before the Committee.

[b] No. 423, 24th October 1856.

1 *Letter*^[b] *from the Brigadier Commandant of Artillery to the Secretary Military Board.*—Approving the principle of marking as proposed, and as obtained of old in the Madras Artillery, the reason of the discontinuance of which he has been unable to ascertain; suggests that before offering any opinion on the precise marks now to be engraved, it would be expedient that the scales be submitted for examination and test; as, to render them applicable to both the Artilleries, it should be certain that they correspond with the Madras tables of Ranges &c.

[c] No. 4000, 31st Oct. 1856.

2 *Letter*^[c] *from the Secretary Military Board to the Brigadier Commandant of Artillery.*—States “that the question submitted for opinion “is the engraving the range in yards for round shot,—the “range for Shrapnell and length of fuze.—these tables may “be such as are most approved; but the question now for “decision is the propriety of engraving such Tables.”

OPINION.—The Committee observe that the Tangent Scale, partially marked as proposed in this suggestion, was in general use with the Madras Artillery formerly, though discon-

tinued for some years past, (under what authority is unknown) and was improved by Mr. Conductor Thompson to the *full extent* now proposed, and approved and recommended for trial by the Madras Artillery Select Committee in Meeting 109, Article 300,* dated 17th January 1840 (attached to these Proceedings) but does not appear to have been again noticed.

2. The Committee concurring fully in that approval, now recommend its adoption; but consider it important that the Tables by which graduated should first be ascertained to be suitable by actual trial, or comparison with the Tables in long use with the Madras Artillery, and which are nearly identical with those of the Royal Artillery.

* ARTICLE 300.

ON A LETTER AND MEMORANDUM FROM CONDUCTOR THOMPSON ON INCREASING THE EFFICIENCY OF TANGENT SCALES. PLATE 102.

*To the Acting Director of the Artillery Depot,
Saint Thomas' Mount.*

Sir,—I take the liberty of forwarding a memorandum regarding the Tangent Scales of light Field Ordnance, and should you think the subject deserving of notice, I have the honor to request, you will have the kindness to lay it before the Brigadier Commandant of Artillery.

(Signed) J. M. THOMPSON,
Conductor of Ordnance.

ST. THOMAS' MOUNT, }
24th September 1839. }

MEMORANDUM OF A PLAN FOR INCREASING THE EFFICIENCY OF THE TANGENT SCALES WITH LIGHT FIELD ORDNANCE.

The Tangent Scale has already on its semicircular face, all that is necessary for firing spherical case shot with correct-

Artillery Select Committee

Meeting 109. Article 300.

Increasing the efficiency of Tangent Scale.
proposed by Conductor Thompson.

Fig. 1.

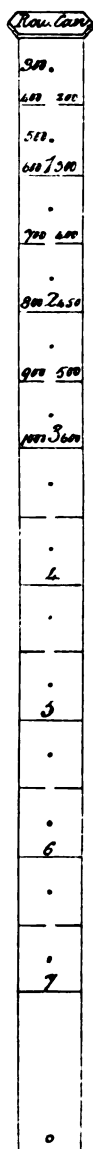


Fig. 2.

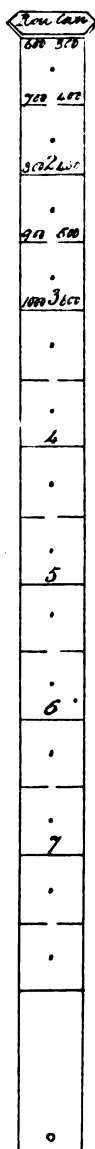
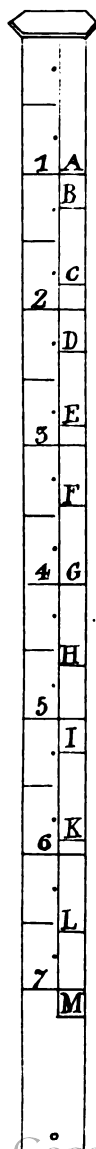


Fig. 3.



ness, that is, the *elevation*, *distance*, and *length of fuze* are given ; but for canister, and round shot, the *elevation only* is engraved on the flat face of the Scale ; thus, when firing either of the latter description of projectiles, reference must be had to tables of previous practice, or trust to the memory for the elevation required for the distance ; to obviate this, it is proposed, that the distances corresponding with the degrees of elevation of the Tangent Scale, be engraved on it, as shewn in Fig 1 and 2, thus any one at the gun, who can read, would be able to give the necessary elevation, on the distance being known.

Suppose a canister shot is directed to be fired, and the distance known to be 400 yards, the Scale has only to be drawn up, until the figures 400, under "Can" are level with the block of the Tangent Scale, and the gun may be laid for the object with certainty of effect.

On the 6 Pdr. Scales as now engraved, are the letters A. B. C. &c. fig. 3, but which are unnecessary in this Service, being only applicable to the Royal Artillery, who always carry the fuzes for spherical case shot prepared for the different distances ; but here, the fuzes are carried ready for adjusting to any distance, being all cut to one inch in length.

Fig. 1. is a Tangent Scale, for a 6 Pdr. having a dispart sight and fig. 2 for a gun without a dispart

(Signed) J. M. THOMPSON,
Conductor of Ordnance.

The letter and memorandum having been read, the Committee are disposed to consider the alterations suggested in the Tangent Scale, likely to be of benefit to the Service, and recommend one being made up and fitted to a gun under the Conductor's own supervision, and to be reported on at a future Meeting of the Committee.

ARTICLE 732.

ON ALTERING THE DWARF TRAVERSING PLATFORMS AND GARRISON CARRIAGES FOR 56 AND 68 PDR. GUNS, ACCORDING TO THE NEW PATTERN RECEIVED FROM ENGLAND.

[a] Extract from Proceedings No. 4132, 3d Nov. 1856,

The Military Board forward [a] the undermentioned correspondence for the report of the Select Committee.

[b] No. 622, 1st October 1856.

1. *Letter [b] from the Superintendent Gun Carriage Manufactory to the Secretary Military Board.*—Forwarding copies of three letters received by him from Deputy Assistant Commissary J. Curran in England.

2. *Letter from the Secretary Military Board to the Superintendent Gun Carriage Manufactory*;—Requesting the views of the Superintendent Gun Carriage Manufactory on the various alterations brought to notice in Mr Curran's letters forwarded with the above, viz. the oscillating elevating screw; wrought iron semelle; position and shape of the pivot iron;—one uniform Platform for 42,—32 Pdrs. and 8 Inch Guns, and one for the higher or heavier Guns such as the 56 and 68 Pdrs. and 10 Inch Guns; uniform size of scantling for both Platforms, with the exception of the space between the sides;—Four trucks; Platforms for lighter Guns of Fir, and for heavier, Teak or other hard woods.

[d] No. 701, 31st October 1856.

3. *Letter [d] from the Superintendent Gun Carriage Manufactory to the Secretary Military Board.*—Considers the alterations in the new Carriage and Dwarf Traversing Platforms for Garrison Ordnance improvements, and recommends their introduction in all future constructions:—Quotes Extract from Mr Curran's letter which enumerates all the alterations.

[e] Select Committee Proceedings Meeting 191, Article 720, Artillery Records page 497

Correspondence on the subject of these alterations laid before the Select Committee on a former occasion [e] is adverted to.

OPINION—The Committee decidedly recommend the introduction of all the improvements, approved of in the Royal Artillery pattern in future manufactures, as pointed out in the annexed Extract of a letter from Mr. Curran, quoted in letter No. 701, dated October 31st, 1856, from the Superintendent of the Gun Carriage Manufactory.

Extract of a letter from Mr. Curran of the Gun Carriage Manufactory, dated 1st August 1856.

“ I have been told by the constructor of the Carriage Department, that the new pattern Dwarf Traversing Platforms and Garrison Carriages have been sent out to each of the Presidencies some months since, most probably they have ere this arrived at Madras.—This new pattern will make some little alterations in the old ones, the principal of which are:—the oscillating elevating screw and wrought iron semelle in the Carriages, and the position of the pivot iron as well as a different kind of shaped pivot iron in the Traversing Platforms. The principle which rules here with regard to the Platforms, is this, one Platform for 32,—42 Pdr. and 8 Inch gun, and one for the higher or heavier guns, such as 56 Pdr., 68 Pdr., and 10 Inch gun. The size of scantling is the same for both Platforms, and in all respects alike, with the exception of the space between the sides through which the Carriages slide up and down; there are to be only 4 Trucks or two pair to each; only the Platform for the lighter guns is made of Fir, and that for the heavier of Teak, or some other harder wood than Fir.”

Extract from the Proceedings of the Military Board No. 5161, 12th Dec. 1856.

DECISION.—The Board authorize the Superintendent Gun Carriage Manufactory, to prepare and lay before the Committee the proposed articles as recommended, and to be reported upon by the Select Committee.

ARTICLE 733.

ON A SUGGESTION BY MAJOR G. ROWLANDSON FOR ALTERING THE HANDLES OF AMMUNITION BOXES, TO ALLOW OF CARRYING OFF DISABLED CARRIAGES.

The above suggestion submitted for the opinion of the Select Committee by order of the Brigadier Commandant of Artillery.

The undermentioned documents are laid before the Committee.

[a] No. 280, 15th July 1856. 1 *Letter* ^[a] *from Major G. Rowlandson Director Artillery Depot to the Brigadier Commandant of Artillery.*—Bringing to notice the impracticability of packing the carriages of disabled guns, from the circumstance of the Limber and Waggon Ammunition Box handles being fixed upright, instead of, as he believes of old, and now in the Royal Artillery, with a hinge to fold down flush with the lid of the Box, or moveable on a pivot to be shifted round below the level of the lid.

[b] No. 1929, 29th July 1856. 2 *Extract* ^[b] *from the Proceedings of the Military Board, forwarding letter* ^[c] *from the Superintendent Gun Carriage Manufactory.*—Advises to adhere to the present established pattern, if the exercise alluded to by Major Rowlandson could be performed with fixed handles; as with loose handles, the hinge will constantly be getting slack, and in that state the hands of the Gunners are liable to be hurt.

OPINION,—The Committee recommend that the inner handles of the Ammunition Boxes be altered as in the Special Board pattern (if found necessary), to fall backwards only, (not forwards), but propose that experiments be first made by the Sub-Committee at the Mount, to ascertain if any modification can be made in the method of carrying off disabled Carriages, without disturbing the fixed handles;—the result to be communicated at the next Meeting,

Extract from the Proceedings of the Military Board No. 5168, 12th December 1856.

DECISION.—The Board approve of the above recommendation, to reconsider the alteration.

ARTICLE 734.

ON THE ASSIMILATION OF ORDNANCE CARRIAGES OF THE ARMIES OF THE THREE PRESIDENCIES.

[a] No. 3697, 16th October 1856.

The Military Board forward^[a] copies of correspondence from the Government of India, on the assimilation of equipments, and Ordnance Stores of the Bengal and Madras Armies in Pegu and Moulmein, and call for a Report on the assimilation of Ordnance Carriages as called for in Para. 2 thereof as follows.

[b] No. 270, 9th August 1856.

Para. 2. of Letter^[b] from the Secretary to the Government of India, Military Department, to the Secretary to Government, Military Department, Fort St. George.—" 2. I am desired to take the present opportunity to request that the Government of India may be informed how far the instructions contained in Government General Order No. 214 of the 26th August 1842, for the assimilation of the Ordnance Carriages of the 3 Presidencies, have been carried out in the Madras Presidency."

OPINION.—The Committee believing that the Supreme Authority in calling for this report, have in view to ascertain the extent to which assimilation actually exists between the Carriages of the Bengal and Madras Artilleries, feel it indispensable to the satisfactory and exact preparation of the report required, that the Bengal Carriage of the G. O. G. pattern of 1842, *as modified by the subsequent important and repeated alterations* which have been made therein, as shewn by the several published Proceedings of the Permanent Artillery Select Committee of Bengal, should be before the Committee; and therefore solicit to be furnished with a drawing and dimensions of the modified Carriage, as *now* established, for

comparison with the Madras established Carriage, constructed in 1853, on the basis of the pattern of G. O. G. No. 214, 26th August 1842.

ARTICLE 735.

ON A PROPOSED ALTERATION IN REAR OF AMMUNITION WAGGONS CONSEQUENT ON THE ADDITION OF THE CARBINE BOX.

The above proposition submitted for the opinion of the Select Committee by order of the Brigadier Commandant of Artillery.

The undermentioned Documents are laid before the Committee.

[a] No. 4499, 18th Nov. 1856. 1. *Letter^[a] from Military Board to the Commandant of Artillery.*—Forwards plan of Ammunition Waggon, to be lithographed for distribution to Ordnance Officers.

[b] No. 460, 21st Nov. 1856. 2. *Letter^[b] from the Commandant of Artillery to the Secretary Military Board.*—Suggests that as the contemplated alteration in the Waggons will have to be submitted to the Artillery Select Committee, before it is decided upon, it will be desirable to defer the Lithograph of the sketch sent, until the point is settled.

OPINION.—The Committee having tested the suitableness of the height of seat with planks placed on the iron supports as now existing, do not consider any change therein necessary, and suggest the fitting of the foot boards to them, in which the Superintendent of the Gun Carriage Manufactory entirely concurs.

MEETING 193.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL A. SHIRREFF, BRIGADIER COMMANDANT OF ARTILLERY.*Artillery Depot Saint Thomas' Mount, 26th February 1857.***PRESENT.**COLONEL P. HAMOND, *Principal Commissary of Ordnance.*COLONEL P. J. BEGBIE, *Commanding 5th Battalion Artillery.*MAJOR G. W. Y. SIMPSON, *Superintendent Gun Powder Manufactory.*MAJOR G. BRIGGS, *Acting Assistant Adjutant General of Artillery.*MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*MAJOR G. ROWLANDSON, *Director Artillery Depot.*LIEUTENANT H. G. BISHOP, *Qr. Mr. & Interpreter 5th Battalion Artillery.*LIEUTENANT L. BRIDGE, *2d Battalion Artillery.*LIEUTENANT G. B. PRIOR, *Adjutant 5th Battalion Artillery.***ARTICLE 736.****ON UNIFORMITY IN SIZE AND WEIGHT OF PROJECTILES USED IN PROOF OF ORDNANCE CARRIAGES.**

The Military Board request the attention of the Brigadier Commandant of Artillery, to the variation

Extracts from Proceedings Nos. 4196 and 4370, dated 4th and 11th November 1856.

in the weight and diameter of shot and shells used at proofs of Light Field Carriages and Mortar Beds.

The undermentioned documents are laid before the Committee.

(b) No. 461, 21st November 1856. 1. *Letter^(b) from the Brigadier Commandant of Artillery to the Secretary Military Board*,—of which the following is an Extract.

“2.—It will be observed, that in no case is any projectile used below the established weight; and all above that, adds, of course, to the severity of the Proof; but I consider it would be inexpedient to raise any shell by artificial

“ means to a higher weight than the standard ; if they have
 “ been passed into the service in that state from the founders,
 “ we use them ; but to make them so, would, in the event of
 “ failure of the Carriages under proof, furnish a plea in
 “ excuse of the same, and I see no advantage of introducing
 “ such a system.”

“ 3.—As to Windage, the projectiles are individually se-
 “ lected from the highest Gauge and most perfect available ;
 “ but so long as they are of established Gauge, I do not con-
 “ sider they can be objectionable, though both in theory and
 “ practice, the selection of the very highest we have, receives
 “ due attention.”

(a) No. 4660, 24th No-
 vember 1856. *2. Extract from the Proceedings of the
 Military Board^(c).—“ The Board consider
 “ that the Projectiles used for the proof of carriages, should
 “ be uniform as to size and weight, and these two points
 “ should, when decided upon, be adhered to.”*

The subject is submitted for the opinion of the Select
 Committee by order of the Brigadier Commandant of Ar-
 tillery.

OPINION.—The Committee is of opinion that shot and
 shell issued for service, are adapted for the Proof of Carriages.

2. The Committee is further of opinion that the difference
 of weight in its effect on the Proof, is comparatively imma-
 terial, as compared with the measure of the windage of the
 projectiles. The Committee is therefore of opinion that the
 present system of selecting projectiles of given windage should
 be adhered to.

ARTICLE 737.

ON THE EFFICIENCY OF TIN WADS FOR PREVENTING THE LEADING OF THE RIFLES.

The Military Board forward^(a) the un-
 dermentioned correspondence to be laid
 before the Select Committee, relative to

(a) Extract from Proceed-
 ings No. 4615, 22d
 November 1856.

Tin Wads, suggested by Major G. T. Haly, Commanding the Malabar Police Corps.

(b) No. 116, 14th August 1855.

1. *Letter^(b) from the Military Board to Government and its accompaniments.*—Submits copies of Reports from Major Haly Commanding the Malabar Police Corps, of comparative practice carried on by him, to ascertain the relative merits of the doubled grooved Rifle with a minie pattern bullet, and the minie English Rifle; and also the result of experiments in support of a proposed remedy for “leading,” by using a disc or wad of tin over the powder when the fouling impedes loading.

Major Haly's “Minie” and “Enfield Rifle” cleansing “Wads.” Memo. by Major G. T. Haly, Commandant Malabar Police Corps, dated Malliapoorum, 5th August 1855.

Major Haly's “Wad” for preventing “Minie Rifles” from leading, or clearing the barrel of fouling, is of “Block tin,” rather convex, so as to admit of expansion, and thereby enter the grooves when fired off; with a circular hole in the centre, to prevent interference with the propelling principle of the Minie bullet.

One of these with the convex side downwards over the powder after every tenth shot, or as soon as it is found that the “Bullet” does not slip home freely, will keep the “Rifle” clear of lead for any amount of rounds, and prevent the necessity for even spunging out; this “Wad” clearing all before it.

Copy of letter from Captain A. Davies H. M. 74th Highlanders, to Major Haly, dated 1st August 1855.—“Having seen 50 shots fired out of two of your Minie Rifles, I have no hesitation in stating that the “Block tin Wad” used, fully answered the purpose of clearing the barrel of lead, inasmuch as I have observed that upon one of them being used after the 48th shot had been fired, in ramming home which some difficulty had been experienced, the 50th shot slipped home as easily as the first had done.”

Copy of letter from Lieutenant B. Davies H. M. 74th Highlanders, to Major Haly, dated 1st August 1855.—"I was "much delighted yesterday with your "Minie Rifle" shooting, "and as you have asked my opinion about the "Tin Wads," "I am glad to be able to state that I consider them to be of "greatest use, inasmuch as they so clear the barrel after 15 or "20 shots, that the next bullet (after firing a tin wad) slips "home as easily as when the piece is first loaded."

(c) No. 2900, 7th November 1856.

2. *Extract^(c) from Minutes of Consultation with accompaniments.*—In which latter, Major Haly remarks on the Reports of the Officers Commanding H. M. 43d, and 74th Highlanders, which are unfavourable to the adoption of Major Haly's wads; as from experiments made by the former Officer, the barrels did not appear in the least degree leaded after firing 56 rounds from one piece and 61 rounds from another; and that on examining several of the discs, picked up after firing, there was no appearance of their having expanded in the least degree, nor the slightest mark upon them, whereby it would have been seen that the edges of them had entered the grooves of the Rifles.

The latter Officer states, his having known a similar metallic wad used in grouse shooting many years ago, and the effect would be to reduce the Rifle to a smooth bore; he also attended experiments made with the Minie Rifle at Woolwich in 1851, and on more than one occasion saw one hundred rounds fired from a musket, without any apparent inconvenience in the loading;—does not think the adoption of Major Haly's wadding, at all necessary or desirable.

Major Haly adds Reports from Capt. T. Maitland, Chief Superintendent of Gunnery Practice of H. M.'s Ship Excellent Portsmouth, and Lieut. and Adj. G. R. Blomfield Malabar Police Corps;—both Officers report in favor of the wads,—the former Officer having fired 100 rounds from the Minie Rifle, using a wad after every 10 rounds, when there was no more difficulty in loading after the 100th round than there was after

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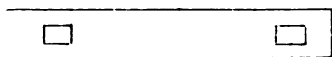
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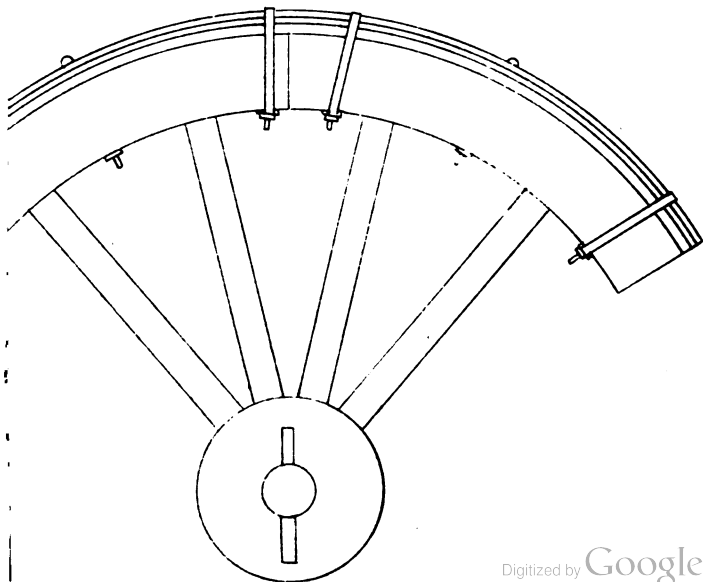
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the first ten, which proves the efficiency of the wads, it having been found that the Minie Rifle fired in the ordinary way begins to foul after 30 or 40 rounds; tried the wads after 40 or fifty rounds, they cleared the barrel in some measure, but had not the effect as when used after every 10 rounds.

(d) No. 5509, 18th November 1856. **3. Letter^(d) from the Adjutant General of the Army to the Secretary Military Board.**—Forwarding Minutes of Consultation 31st August 1855, No. 2459; Abstract of correspondence connected with Major Haly's Tin Wads, and Minutes of Consultation 7th November 1856; and requests that the same be referred to the Select Committee of Artillery Officers, in order that Major Haly's wad may have a fair and impartial trial; the result to be reported for the Commander in Chief's information.

OPINION.—The Committee recommend that the Secretary forward to Major Haly, specimens of the Tin Wads made at the Depôt, and if they be approved by him, that a series of Experiments be carried out by Members of the Committee at the Mount, and the result submitted at their next Meeting to the Committee.

ARTICLE 738.

PLAN FOR FACILITATING THE MOVEMENT OF FIELD CARRIAGES OVER SOFT GROUND, SUGGESTED BY RUSSIAN GUN CARRIAGE WHEELS AT PAGE 339, MADRAS ARTILLERY RECORDS—HEAD "MISCELLANEOUS" PROPOSED BY CAPTAIN T. H. CAMPBELL, COMMISSARY OF ORDNANCE, BANGALORE.

The above was suggested by the supposed intention of the Russian wheels, described in Artillery Records, "Miscellaneous," page 339, February 1856, and submitted for the opinion of the Select Committee by order of the Brigadier Commandant of Artillery.

(a) No. 848, 22d December 1856. A letter^(a) from Captain T. H. Campbell to the Director Artillery Depot, and a model^(b) shewing the construction of axle and

(b) Plate 103.

wheels, to adapt Heavy Field Carriages for transit over marshy, or sandy ground, are laid before the Committee.

OPINION.—The Committee do not feel competent, or called upon, to pronounce an opinion, on the precise intention of the peculiar construction of the Russian wheels and axletree arms, which evidently belongs exclusively to Garrison Carriages, and would never do for a travelling carriage; but, supposing Captain Campbell's explanation to be the real one, they are not prepared to recommend the introduction of such a contrivance for this country.

ARTICLE 739.

ON A PATENT APPARATUS FOR POINTING ORDNANCE.

The Military Board forward^(a) copy of a pamphlet on the subject of a patent apparatus for pointing Ordnance, the invention of Major Davidson of the Bombay Army, for submission to the Select Committee, together with the undermentioned documents.

1. *Copy of letter from Major W. K. Worster to Lieut. Colonel G. Balfour C. B.*—States there can be no doubt as to the truth of the principles advocated, but thinks Major Davidson reverses the usual mode of procedure with collimators; a telescopic sight fixed to a heavy gun was tried by General Montgomerie (and similar sights have been fixed to rifles.)

2. *Minute by Lieut. Colonel G. Balfour C. B.*—Lays before the Military Board two copies of a Pamphlet, being a description of a patent apparatus* for pointing Ordnance by Major Davidson Bombay Army, and proposes its being forwarded to the Artillery Select Committee for consideration and report.

* "The apparatus consists of a telescope temporarily applied to the piece, "and looking backwards or behind it, where, at a short distance, just clear of the "recoil, is fixed a collimating telescope, whose cross lines are to be bisected by "those of the first telescope."

OPINION.—The Committee in the absence of means of testing the value of this method of laying Ordnance, cannot pronounce positively on its merits ; but from the perusal of the pamphlet and consideration of the nature of the process required in the use of the Instruments, although they recognize the soundness of the reasoning, incline strongly to the opinion, that our present means for laying a gun, cannot be advantageously superseded by the refinements of complicated and expensive scientific contrivances.

Extract from Military Board's Proceedings No. 7714, dated 17th March 1857.

DECISION.—The Board consider that as the application of the principle advocated has been found useful when applied to fowling pieces, that it is still more applicable to Ordnance, and that an experiment should have been made.

ARTICLE 740.

ON THE INTERCHANGE OF CORRESPONDENCE BETWEEN THE SELECT COMMITTEES OF THE THREE PRESIDENCIES.

(a) Extract from Proceedings No. 5685, 6th January 1857.

(b) Extract Minutes of Consultation of Government No. 3379, 23d December 1856.

The Military Board direct^(a) that a communication^(b) from the Government of India, regarding an intercommunication between the Select Committees of the three Presidencies, when a change is proposed in Ordnance Equipments be submitted to the Select Committee.

(c) Meeting 142, Article 464, Artillery Records page 616.
Meeting 155, Article 522, Artillery Records page 955.

Meeting 161, Article 577, Artillery Records page 71.

(d) Extract from Proceedings No. 5697, 7th January 1857.

The former Proceedings^(c) of the Select Committee on the same subject are also laid before them.

Additional Correspondence received from the Military Board^(d) is also laid before the Committee.

(e) No. 932, 30th July 1856.

Letter^(e) from the Secretary to the Government of India to the Adjutant General of the Bengal Army.

* * * *

“ 2. I am desired to request that you will move His Ex-

“cellency to instruct the Select Committee of Artillery Officers, when recommending changes in the equipment of Ordnance of any description, invariably to obtain the opinion of the Select Committee at Madras and Bombay on the proposals, before submitting their views for the orders of Government. It is impossible to hope for the establishment or maintenance of uniformity in the Artillery Branch of the Indian Army, if Select Committees can independently recommend alteration and addition.”

(f) No. 19, 16th October
1856.

Letter^(f) from the Adjutant General of the Bengal Army to the Secretary to the Government of India.—“Referring to your letter No. 932, of the 30th of July last, paragraph 2d, I am now desired by the Commander in Chief to forward, for the consideration of Government, the accompanying letter, in original, from the Secretary to the Select Committee of Artillery Officers at Meerut, on the subject of the instructions contained in your Despatch cited, to the effect that this Committee shall invariably obtain the opinions of the Select Committees at Madras and Bombay on proposals for any changes in the Equipment of Ordnance of any description, before submitting such proposals for the orders of Government.”

“2. With advertence to the 13th paragraph of Captain E. B. Johnson’s letter, I am to offer General Anson’s opinion, that the correspondence of the respective Select Committees should not be carried on direct from one Secretary to the other, but through the Adjutants General of the several Presidencies; and further that, in the case contemplated in the second clause of this paragraph, the reply ought to be sent to the referring Committee through the Adjutant General of the Army.

“3. In regard to the 3d clause of the same paragraph, the Commander-in-Chief thinks it advisable, that the whole of the correspondence, and an abstract, should be furnish-

"ed; and with reference to paragraph 14, His Excellency desires to suggest the expediency of constituting the Commandants of Artillery at Madras and Bombay, respectively, *ex-officio* Presidents of the Select Committee at these Presidencies, as is the case in Bengal.

"4. His Excellency, I am to add, does not think it necessary to offer any observations upon the remaining portion of the Secretary's communication."

Letter(s) from the Secretary Bengal Artillery Select Committee to the Assistant Adjutant General of Artillery Meerut.—*No. 330, 12th Sept. 1856.*—"With reference to the 2d para of letter No. 932, of date the 30th July, to the address of the Adjutant General of the Army, from the Secretary to the Government of India, Military Department, conveying the instructions of Government for the guidance of the Permanent Select Committee of Artillery Officers, that, when recommending changes in the Equipment of Ordnance of any description, the Committee shall invariably obtain the opinions of the Select Committees at Madras and Bombay on the proposals, before submitting their views for the orders of Government, I have the honor, by direction of the Permanent Select Committee, to communicate, for submission to His Excellency the Commander-in-Chief and to Government, through the Commandant of Artillery, their entire concurrence in the expediency of intercommunication between the three Committees, on all subjects relating to the Equipment of Artillery, as the most effectual means for securing the assimilation of the Ordnance of the three Presidencies. Previous to carrying out these instructions, they would however respectfully submit, for the consideration of Government, certain questions connected with the subject, which it appears absolutely necessary should be determined, before the orders conveyed in Colonel Birch's Despatch can be satisfactorily carried out."

“2. During the last twenty years, the question of uniformity in the Ordnance Equipments of the Artillery Regiments of the three Presidencies has been under the consideration of the Supreme Government, and more particularly with reference to the pattern of Field Carriages, specially reported on by a Committee of Artillery Officers of the three Presidencies, assembled in Calcutta in the years 1836, 1837 and 1838.”

“3. Consequent on the Report of this Committee, and on various other reports which were submitted to Government, relative to the merits of the Field Carriages in use with the Bengal and Bombay Detachments of Artillery employed in Affghanistan, it was resolved that the Royal pattern Block Trail Carriage, as used in Bengal, should be considered the established pattern Field Carriage for the three Presidencies, with the Limbers and Ammunition Carriages attached; the O. P. Bengal Store Cart, without Limber, being laid down as the pattern for Forge and Store Carts with Batteries.”

“4. This Resolution was published in G. O. P. C. No. 214, 26th August 1842, and approved musters of the several Carriages, with Limbers complete, carefully fitted and equipped with ammunition and stores, were ordered to be sent to the Arsenal of Madras and Bombay for future guidance. Muster Carriages, as above, were accordingly, in obedience to the order, shortly afterwards forwarded to those Presidencies.”

“5. As the operation of the G. O. on this subject was directed to be prospective, and not to interfere with the Carriages and Equipments in use or in store, it was to be anticipated that, for some years to come, the process of assimilation contemplated by Government would be very gradual.”

“6. It is now, however, fourteen years since the order for the adoption of the Bengal pattern Carriage was pub-

lished, but the Committee apprehend that, up to the present time, it has been but very partially carried out, either at Mādras or Bombay; the Carriages in use at those Presidencies still materially differing from the established pattern."

"7. With these distinctions, as they now exist, in the Carriages and Equipment of Ordnance, and also in the systems of Draught adopted in the respective Presidencies, it is almost unnecessary to observe, that there must be a number of questions and references in each Presidency, bearing on the peculiar pattern or system in present use, on which the Select Committees, respectively, of the other Presidencies, are incapable of giving an opinion, and on which, therefore, reference would be useless,"

"8. In illustration of what is now advanced, I am directed to point out, that there are, at this time, under the consideration of the Bengal Committee, two questions involving, possibly, changes in the Equipment of the Bengal Carriages. The one being the construction of Collar Bars, and the other of axletrees. References on these two subjects to the other Presidencies would, the Committee submit, be attended with no beneficial result. As regards the first mentioned, the answer of the Madras Committee doubtless would be that, as the Bengal system of Breeching to the Collar Bar is unknown in Madras, they do not feel themselves competent to pronounce upon the merits or defects of the Collar bar in question, the construction depending materially on this very point; while a reference to Bombay would probably elicit the reply, that as shafts are used, and not poles, in the Artillery, their Committee are unable to give an opinion on the question."

"In the same manner, under the circumstances of the axletrees of the Carriages in present use at Madras and Bombay being of a different pattern from that in use in

“ this Presidency, a reference on this subject also would be
 “ unattended with any useful result.”

“ 9. These two important parts of the Bengal Equipment
 “ have been specially adverted to, as their construction is now,
 “ at the instance of the Commandant of Artillery and the
 “ Inspector General of Ordnance, actually under the consi-
 “ deration of the Select Committee; but questions of equal
 “ importance, affecting the Equipment of Ordnance, may at
 “ any time arise at either of the Presidencies, on which it
 “ would be manifestly impracticable for the Committee, at
 “ the other Presidencies, to give an opinion, simply from the
 “ dissimilarity in the component parts of the Carriages, as
 “ well as their Equipment, and from the different systems
 “ obtaining in regard to Draught,”

“ 10. Having thus briefly submitted the causes which
 “ appear to militate against the orders of Government, com-
 “ municated in Colonel Birch's letter under acknowledgment
 “ being fully carried out, the Committee respectfully suggest
 “ that, in view to their guidance as to the subjects on which
 “ references might be advantageously made to the other Com-
 “ mittees, Statements may be called for from the Presiden-
 “ cies of Madras and Bombay, of the extent to which the
 “ General Order of August 1842, for assimilation, and for
 “ the general introduction of the ‘ established pattern Field
 “ Carriages’ has been carried out; and that lists may be
 “ furnished, showing the extent to which the Ammunition,
 “ Equipments and Stores, which were forwarded from Ben-
 “ gal as musters, have been adopted. On being furnished
 “ with this information, the Committee would be able to as-
 “ certain on what subjects mutual reference and communica-
 “ tion between the Committees would be attended with those
 “ advantages which have been contemplated by Government,”

“ 11. Another important question that suggests itself to
 “ the Committee is the channel of communication which Go-

“vernment would desire to be observed between the three
 “Committees, as well as the manner of dealing with the re-
 “sults of their discussions, which, it may be assumed, would
 “not unfrequently be conflicting.”

“12. The Committee accordingly respectfully solicit
 “instructions on the following points:”—

“*First.*—Whether the communications between the Select
 “Committees of the three Presidencies are to be made direct
 “to one another by means of their Secretaries, independent
 “of the Regimental and Army authorities and Governments
 “of the respective Presidencies?”

“*Second.*—Whether questions referred to the Bengal Com-
 “mittee, by those of the other Presidencies, on which there
 “might be a common agreement, should be submitted to the
 “Supreme Government by this Committee, through the
 “usual channel, or merely returned to the referring Com-
 “mittee with a reply?”

“*Third.*—Whether, on occasions of a difference of opi-
 “nion, between the Committees, on subjects referred to, or
 “by the other Presidencies, the whole proceedings on each
 “subject are to be submitted to the Supreme Government,
 “or merely an abstract of the opinions of each Committee?”

“13. If the discussion of Ordnance questions be autho-
 “rized between the three Committees, without the interven-
 “tion of superior Military authorities and Governments
 “respectively, it appears to this Committee, that anomalies
 “may arise, which might be productive of inconvenience to
 “the Service and prove an impediment to that assimilation
 “which is so desirable.”

“14. The Bengal Committee differs, it is believed, in its
 “constitution from that of the other Presidencies, the Com-
 “mandant of Artillery occupying the post of President while
 “the Commandants of Madras and Bombay are not connect-
 “ed with, and take no part in the proceedings of the Select

“Committees. It might thus happen, that subjects suggesting themselves to the Committees of those Presidencies as worthy of discussion, and importantly connected with the Equipment of Ordnance, would be referred for the opinion of this Committee, without the knowledge or concurrence of the respective Commandants, who, it is assumed, should have a voice on all questions, in any degree affecting their command. On this account, therefore, direct communication between the three Committees on Ordnance questions would be open to objection.”

“15. The Committee beg further to point out, that the functions of the Permanent Select Committee embrace not only the duty of enquiring into, and reporting on subjects referred to it by Government and the Commander-in-Chief, but extend to directing their attention generally to the improvement of Ordnance, &c., and suggesting such alterations as may appear necessary from time to time, in connection with this important arm; but while the power of initiating and suggesting improvements in Ordnance matters is thus exercised, it is apprehended that, if the liberty of direct discussion on such subjects between the Committees be sanctioned, there will practically be no limit to the questions that may be brought under discussion.”

“16. With a view to remove these objections, the Committee respectfully suggest, for the consideration of Government, the expediency of limiting the intercommunication between the Committees to subjects, the discussion of which may have previously received the sanction of the Commander-in-Chief of the Presidency in which the proposition may originate.”

“17. This course would secure every question coming under the cognizance of the Commandants of Artillery in each Presidency, suggesting any alteration.”

“18. If all questions transmitted under the above authority to the three Committees, and unanimously agreed

“to by them, were subsequently submitted to the Supreme Government, (as the only authority in future for sanctioning alterations in the Ordnance Department in India,) through the Commander-in-Chief and Government of the Presidency in which they originated, there would appear to be ample security against the adoption of hasty or ill-digested alterations in this important Department of the Service.”

“19. In conclusion, the Committee deem it their duty to point out, that the communications suggested between the Committees of the three Presidencies will necessarily involve an increased correspondence, for which the present Office Establishment will probably be found inadequate; the extent, however, of the increase which would be necessary will depend on the amount of additional work devolving on the Committee, and which can only be determined, when Government shall have decided upon the extent to which such communication shall be carried on, and by practical experience of the working of the system.”

(A) No. 757, 24th November 1856.

Letter^(h) from the Secretary to the Government of India to the Adjutant General of the Bengal Army.—“In reply to your letter No. 19, of the 16th October last, I am directed to acquaint you, for the information of the Commander-in-Chief, that the Right Hon’ble the Governor General in Council is pleased to approve of the course proposed by His Excellency for intercommunication between the Select Committees of Artillery Officers of the three Presidencies.”

“2. A communication will be made to the Governments of Madras and Bombay on the subject.”

OPINION.—The Committee have received with cordial satisfaction, the sanction of the Supreme authority to a measure suggested by the Madras Artillery Select Committee in their Meeting No. 142, Article 646, dated 23d July 1847.

G. O. G. 27th Jany. 1824.—“1. The
 “Permanent Select Committee of Ar-
 “tillery Officers will assemble as occa-
 “sion may require, to report upon such
 “professional matters, as may be sub-
 “mitted for their consideration. The
 “Committee to consist of the Principal
 “Commissary of Stores, the Director of
 “G. O. G. No. 149, } “the Artillery Depot
 “23d June 1846. } “of Instruction, the
 “Assistant Adjutant General of Artil-
 “lery, the Superintendent of the Gun
 “Carriage Manufactory, the Superinten-
 “dent of the Gun Powder Manufactory,
 “if an Officer of Artillery, and the four
 “Senior Officers of Artillery at the
 “Mount, any five being a Committee,
 “the Senior Officer sitting as President,
 “and the Director of the Artillery
 “Depot Acting Secretary, having the
 “duty of recording all the Committees
 “Proceedings in his office.”
 “2. The Commandant of Artillery
 “does not sit upon this Committee, as
 “he is the channel of the Reports to
 “the Military Board, where he will
 “always have an opportunity of record-
 “ing his own sentiments, whether in
 “concurrence or dissent, in the latter
 “case the grounds of such dissent being
 “always recorded at length.”

2. By the G. O. G. originally establishing the Select Committee in the Madras Artillery, as per margin*, the true position of the Commandant of Artillery in relation to the Proceedings of this Committee is clearly set forth, as recommended by the distinguished and experienced Officer who proposed its formation in 1824, (Lieut. Colonel Noble C. B.) and approved of by the then Governor in Council, Sir Thomas Munro, Bart. than whom no one, it is presumed, was better capable of

appreciating its true value; and the experience of 33 years practical operation, has most fully justified the wisdom of that arrangement; the Committee venture to express the opinion that the substitution of the recently introduced plan in Bengal of a Committee almost exclusively composed of the Regimental Staff, presided over by the Commandant in person, is liable to objections, viz.

1st. to circumscribe injuriously the range of practical experience heretofore brought into the discussion of professional subjects, by the addition to the official members, of four senior Regimental Officers at Artillery Head Quarters, and

2d. to embarrass the free and unreserved expression of opinions, and discussion of questions, by the presence of the Commandant; whose high rank and advanced age and experience, would naturally often repress the utterance of contrary opinions by junior members however just and well founded, and

3d. Would sacrifice the present advantage, of the endorsement of the calm and matured opinion of the Head of the Regiment, on the questions disposed of by the Committee,

in his review of their proceedings in their passing through his hands to superior authority.

3. Under the express provision of the G. O. G. above quoted, as confirmed by the experience of 33 years practice, it will be observed, that the arguments advanced by the Bengal Committee in para 14, of their letter No. 330, to the Adjutant General Bengal Army, viz. that "the Commandants of Madras and Bombay are not connected with, and take no part in, the Proceedings of the Select Committees," is entirely a mistaken one; as the Committees Proceedings can only reach superior authority, through the channel and with the countersignature of the Commandant; whose opinions in dissent forwarded therewith, (it is on record) have when well grounded prevailed to supercede the Committee's recommendations; and consequently, the reasons deduced by the Bengal Committee, based on this misapprehension in support of their view of the necessity for the Commandant being always President, and present in discussion, are misplaced, and fall to the ground.

4. It is evident, therefore, that as the Proceedings of the Committee cannot pass beyond the Commandant, except through him with the endorsement of his opinion *pro* or *con*,—no apprehension of the nature expressed by the Bengal Committee, can be entertained, of any reference being at any time made to the Committees of Bengal or Bombay, "without the knowledge or concurrence of the Commandants," and that therefore, as no necessity can exist for the Commandant being required to preside at the Meetings of the Committee, and as such an arrangement would be contrary to the spirit and letter of the G. O. G. quoted, and opposed to the experience of 33 years beneficial working, as well as prejudicial to the freedom of unembarrassed professional discussion, and would bar the introduction of the largest available number of experienced officers, and is quite unnecessary in order to the full and practical value of the

several Committees, it is earnestly trusted that change in the constitution of this Committee will not be insisted on.

5. The Commander-in-Chief in India (in the letter No. 19, of 16th October 1856, of the Adjutant General Bengal Government to the Secretary to the Government of India, Military Department, para 3) has recommended the above change, constituting the Commandant *ex-officio* President, but His Excellency having done so, it is respectfully observed, solely on the representation of the Bengal Artillery Select Committee, founded on (as has been sufficiently shewn above) an entire misapprehension of the true and wise relation of the Commandant to the Madras Artillery Select Committee Proceedings,—and as this great change has been made without any previous reference to the Madras Committee, it may be justly presumed that had the information herein stated been before His Excellency, he might have seen reason to leave unaltered the existing arrangement.

6. The Committee observe that their Proceedings being printed, the circulation of them for consideration of the other Presidency Committees will be simple in execution, and will not, it is believed, involve any considerable increase of office establishment;—at the same time, they deem it right to draw attention to the heavy amount of work, in connection with the Proceedings of this Committee, for which no allowance of any kind has been granted, whereas in Bengal, an

* A Secretary appointed with salary and establishment as follows:—

	Rs.
Staff Salary.....	150
Writers.....	70
Stationery.....	40
Peons.....	15

Total...275

allowance as per margin* has been allotted to the Officer discharging the same duties, as appears by the Pay and Audit Regulations, and which it seems just should be extended to this Presidency also.

7. The Committee do not attach any great importance to the particular channel through which the views of the Supreme Government may be carried out,—but would observe that the more simple and direct this can be made, the better will the important object aimed at be secured; while from

the results of the intercommunication now ordered, great advantage to the Artilleries of India is confidently expected by the Madras Select Committee.

ARTICLE 741.

ON TANGENT SCALES, RECEIVED FROM BENGAL HAVING ALTERATIONS IN THE METHOD OF MARKING.

The Military Board with reference to former Proceedings ^(a) of the Select Committee on this subject, forward ^(b) Tangent Scales received from Bengal to be separately reported on by the Committee.

(a) Meeting 192, Article 731, page 515, Artillery Records.
(b) Memo No. 5814, 14th January 1857.

OPINION.—That a Memorandum explanatory of the wide discrepancies, particularly at low ranges, found between the Tables of Elevations and lengths of Fuzes, between the Bengal (as per Tangent Scales sent) and Madras and Royal Artilleries published Tables, be forwarded, and explanation solicited from Bengal to enable this Committee to arrive at some satisfactory conclusion, as to the expediency of adopting or otherwise, the Bengal graduations of Tangent Scales,—the principle of graduation having been affirmed at the last Meeting of the Committee.

MEMORANDUM.

The following is the result of the Comparative Ranges, Elevation, and length of Fuze for Shrapnell Shells or Spherical Case Shot, taken from the Tangent Scales received from Bengal, the Madras Gunner's Assistant, and the Royal Artillery Tables.

Distance yards.	24 Pdr. Howitzer.						12 Pdr. Howitzer.						9 Pdr. Gun.						6 Pdr. Gun.					
	B. M. / R.			B. M. / R.			B. M. / R.			B. M. / R.			B. M. / R.			B. M. / R.			B. M. / R.			B. M. / R.		
	Elevation.			Elevation.			Elevation.			Elevation.			Elevation.			Elevation.			Elevation.			Elevation.		
	D.	ths.	ths.	D.	ths.	ths.	D.	ths.	ths.	D.	ths.	ths.	D.	ths.	ths.	D.	ths.	ths.	D.	ths.	ths.	D.	ths.	ths.
500	1½	..	1½	3½	..	1½	1½	..	1½	3½	..	1½	1½	..	1½	1½	..	1½	1½	..	1½	1½	..	1½
600	2	1½	1½	3½	3	2½	2½	2	2	3½	3	2½	2½	2	2	3½	3	2½	2½	2	2	3½	3	2½
700	2½	2½	2½	4½	4	3½	2½	2½	2½	4½	4	3½	2½	2½	2½	4½	4	3½	2½	2½	2½	4½	4	3½
750	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
800	3½	2½	2½	5	5	4½	3½	3	3	5½	5½	4½	1½	2	1½	3½	4	..	2	2½	..	3½	4½	3
850	..	..	..	..	..	..	..	..	..	..	..	..	2	2	3½	..	..	..	..	..	..	..	..	..
900	4	3½	3½	5½	6	5½	4	3½	3½	6½	6½	5½	2½	2½	..	4½	4½	..	2½	2½	..	4½	5	..
950	..	..	..	..	..	..	..	..	..	..	..	..	2½	2½	..	5	5	..	..	..	..	..	..	..
1000	4½	3½	3½	6½	7	6½	4½	4	4	7½	7½	6½	2½	2½	..	5½	5½	..	2½	3	..	5½	6	..
1050	..	..	..	..	..	..	..	..	..	..	..	..	3	3	..	6	6	..	..	..	..	..	..	..
1100	5½	4½	4½	8	8½	7½	5½	5	5	8½	8½	8	3½	3½	..	6½	6½	..	3½	3½	..	6½	7	..
1200	6½	5½	5½	9½	9½	9½	6½	6	6	9½	10	9	3½	3½	..	7	7½	..	3½	4½	..	7	8	..

REMARKS.

The graduation on the flat side of the Tangent Scales received from Bengal for the 24 and 12 Pdr. Howitzers, and 6 Pdr. Gun corresponds with those in use at Madras, but the

Scale for the 9 Pdr. Gun corresponds only at the 4th degree, the remainder of the graduation both above and below being slightly longer than the 9 Pdr. Scales in use here.

The Tangent Scales received from Bengal for the 24 and 12 Pdr. Howitzers, have the ranges and length of Fuze for Spherical Case shot up to 1200 yards marked on the half round side of the Scale, and on both these Scales the following is engraved.

Common Shell a little less elevation and half a tenth more Fuze than for Shrapnell.

The Scales for the 9 and 6 Pdr. Guns have the ranges for round shot up to 1200 yards marked on the flat side, and the ranges and length of Fuze for Spherical Case shot up to 1200 on the half round side.

ARTICLE 742.

ON EXPERIMENTAL SPUNGES WITH RAMMER HEADS OF MODIFIED PATTERNS.

(a) Extract from Proceedings No. 3555, 21st September 1855.

The Military Board direct ^(a) the making up of spunges with a view to remedy the defects in the rammer heads, and that the subject be laid before the Select Committee after the spunges had been subjected to trial at Experimental Practice.

The undermentioned documents connected with the Experimental Spunges, and Reports of trial, are accordingly laid before the Committee.

(b) No. 404, 13th September 1855.

1. *Letter ^(b) from the Commandant of Artillery to the Secretary Military Board.*

(c) For Spunges with Heads Rammer Common Gun 6 Pdr. for Drill purposes, in consequence of the "Spunges with Heads rammer Common," constantly breaking.

"In forwarding the accompanying copy
 "of letter and Indent ^(c) from the Officer
 "Commanding D. Troop Horse Artillery,
 "I have the honor to observe that in Meet-
 "ing 143 of the Permanent Artillery Select Committee, 16th
 "November 1847 Article 470, a proposal of the Brigadier

“ Commandant's to obviate objections to the concave spunges
 “ for howitzers only when at drill and exercise, was disposed
 “ of by an order for the use of separate sponge staves with
 “ solid rammer heads in garrison.

“ 2. The objects stated in Major Mawdsley's 2d para, are
 “ familiar to the experience of, I suppose, all our Regimental
 “ Officers and require remedying,—great numbers of concave
 “ rammer heads do split, at drill and exercise, and no incon-
 “ siderable number of those made up in Arsenals are found to
 “ do the same previous to issue, from mere exposure to atmos-
 “ pheric influence; whether the extension of the rule ordered
 “ for howitzers to the rest of the guns of batteries, will best
 “ remedy the evil, or whether the use of the moveable cap re-
 “ commended by Brigadier Ketchen, which is small, and light,
 “ and simple in construction, and found to answer perfectly in
 “ practice (though with reference to a different object) may
 “ not have most to recommend it, is a question that may be
 “ submitted to the consideration of the Permanent Artillery
 “ Select Committee. The substitution of solid headed sponge
 “ staves for concave, will have the effect of laying up large
 “ supplies of the latter, to dry and split, and fail when sup-
 “ plied for service; and, on the whole, I consider it preferable
 “ to keep *them only* in constant use with batteries, applying
 “ the moveable cap on occasions of drill and exercise, when
 “ the solid head is required.”

(d) No. 2504, 13th De- 2. *Letter^(d) from the Principal Commis-*
 cember 1855. *sary of Ordnance to the Commandant of*
Artillery.—Forwards four 9, and four 6 Pdr. spunges—3
 fitted up, with a plug of “Utta” wood, to fit the cavity of
 Rammer head, bound with copper straps, and having a screw
 bolt to secure it to the nut inside the head, the wood being
 flush with the face of the rammer head when screwed up; it
 is unscrewed by using the end of the worm, as a key.

Five fitted with caps of “Utta” wood filling the cavity in
 the head, but projecting beyond, and covering the face of the

Rammer head, protecting it from splintering ; the edge of the cap is bound with a strap of copper, and it can be screwed on and off by the hand.

(e) Nos. 6 and 7, 3d January 1856. 3. *Letters^(e) from the Director Artillery Depot to the Officers Commanding 2d and 5th Battalions Artillery.*—Forwarding six 9 Pdr. and six 6 Pdr. Experimental Gun Spunges ;—4 of each calibre fitted up as described in the above letter from the Principal Commissary of Ordnance, and 2 of each calibre made entirely of “Palar,” with the outer edges bound with a strip of thin sheet copper ;—to be tested and reported upon.

(f) No. 512, 26th September 1856. 4. *Letter^(f) from the Officer Commanding 2d Battalion Artillery to the Director Artillery Depot.*—States that the Experimental 9 Pdr. Spunges have been used on all occasions at Gun Drill, and firing with blank and shotted Ammunition, offering little, with regard to their utility, to remark upon between each pattern. The two spunges with the rammer heads of Palar wood, appear to be the simplest and best adapted, being available at once either for firing blank or shotted Ammunition.

(g) No. 33, 22d January 1857. 5. *Letter^(g) from the Officer Commanding 5th Battalion Artillery to the Director Artillery Depot.*—States that Experimental 9 Pdr. spunges have been tested, and that he approves of the pattern spunges fitted with caps of “Utta” wood, filling the cavity in the head, but projecting beyond and covering the face of the rammer head, with the edge of the cap bound with copper, and screwed on and off by the hand ; appearing to be well adapted for every use, particularly in the field, as the face of the rammer head can always be kept from getting destroyed. The spunges of this pattern received no injury ; of the other two patterns one of each was damaged in the trial.

[A] Meeting 143, Article 470, Artillery Records, page 642. Former Proceedings^[A] on the same subject are also laid before the Committee.

OPINION.—The Reports on these Rammer heads are fa-

avorable, especially the pattern with the projecting rim to cover the face of the rammer head; but the Committee are not satisfied of the necessity for adopting such an expedient, and in the hope that rammer heads, made of other more suitable woods, especially of "Utta" wood would be found to answer, without any additions, recommend that experiments be made with such other woods as promise success, before the adoption of those now before the Committee be decided on.

Extract from Military Board's Proceedings No. 726, 19th March 1857.

DECISION.—The Board do not consider the report likely to provide a remedy for the defect pointed out by the Board.

Letters Nos. 124 and 151, dated 25th March & 8th April 1857.

The Brigadier Commandant of Artillery solicits the sanction of the Military Board to the preparation of a given number of Rammer heads of "Utta" and other hard close grained woods, and suggests that a number be prepared at the Grand Arsenal, Bangalore, and Secunderabad, to be used with the nearest Batteries, and Reports to be furnished six months after coming into use, and that a discretionary power be given to Ordnance Officers, to try any woods available in their several districts, promising to answer the desired purpose.

Extract from Military Board's Proceedings Nos. 7968, 28th March 1857, & 8268, 10th April 1857.

Letter from Brigadier Commandant of Artillery to the Inspector General of Ordnance and Magazines No. 185, 4th May 1857.

Extract from the Proceedings of the Inspector General of Ordnance and Magazines No. 196, 11th May 1857.

Further correspondence, as per margin, resulted in the Superintendent Gun Carriage Manufactory being authorized to make up experimental rammer heads for different calibres, of "Utta," "Mango," and other hard close grained woods.

ARTICLE 743.

ON THE APPLICATION OF TRUNNION AND GARNISH PLATES TO 68 PDR. CARRIAGES OF THE ENGLISH CONSTRUCTION.

[a] Extract from Proceedings No. 6487, 4th February 1857.

[b] No. 46, 2d February 1857.

The Military Board direct^[a] that the Select Committee may decide on a suggestion contained in a letter^[b] from the Brigadier

Commandant of Artillery, to apply Trunnion and Garnish Plates to certain 68 Pdr. Carriages of the English pattern, about to be constructed to meet the demands of the Service.

OPINION.—The Committee entirely concur in the course recommended by Brigadier Shirreff, Commandant of Artillery, as the best way of providing for the immediate demands of the Service, viz., to apply the usual Garnish plates &c., until the question of their discontinuance is determined by the results of pending experiments.

ARTICLE 744.

ON A BOMBAY PATTERN GARRISON CARRIAGE AND TRAVERSING PLATFORM.

[a] Extract from Proceedings No. 6497, 4th February 1857.

The Military Board direct^[a] that a model of a Garrison Carriage and Platform received from Bombay, be submitted to the Select Committee with reference to former correspondence on the subject.

The undermentioned documents are laid before the Committee.

[b] No. 408, 15th October 1856.

1. *Letter^[b] from the Commandant of Artillery to the Secretary Military Board.*—

States that “all enquiries failed to discover any Carriage capable of being fired on the Bombay Platform, which is designed for a Carriage specially adapted to it, much narrower than any to be found in our Arsenals. Two modes of testing it suggest themselves; one to apply to Bombay for working Plans to construct one of their Carriages; the other to substitute sleepers of sufficient length to admit of our Carriages working on it, but the former would perhaps be preferable, though *both* might be resorted to with advantage.

2. *Bombay Artillery Select Committee Proceedings*—vol. 3, page 48.

“*Extract from Lieut. Colonel Coghlan’s Report on the Artillery Practice at Ahmednugger, No. 27, dated 31st January 1853.*”

Traversing Skeleton
Platform for Battery.
Guns.

“Our Battery consisted of six guns, two 24-pounders, two 18-pounders, and two 12-pounders, on garrison truck carriages. These work well on the skeleton platform, and I hope the question of platform and carriages is finally settled, as I understand it to be, viz. that each gun shall travel on its travelling carriage (which is also a fighting carriage if required to be used as such), and have with it a garrison truck carriage to be used in battery on the skeleton platform, or any other.”

OPINION.—The Committee recommend that the Platform already made, be altered according to the model now received, (or a new one constructed, as may be found expedient, by the Superintendent of the Gun Carriage Manufactory) and that a groove be made in the trail plank, to adapt it for use with our carriages.

Extract from Military
Board’s Proceedings No.
7727, 19th March 1857.

DECISION.—The Superintendent Gun Carriage Manufactory authorized to make the alteration or construction.

MEETING 194.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL A. SHIRREFF, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot Saint Thomas' Mount, 13th June 1857.

PRESENT.

COLONEL P. HAMOND, *Principal Commissary of Ordnance.*

COLONEL P. J. BEGBIE, *Commanding 5th Battalion Artillery.*

LIEUT. COLONEL J. W. CROGGAN, *Commanding 1st Battalion Artillery.*

MAJOR G. W. Y. SIMPSON, *Superintendent Gun Powder Manufactory.*

MAJOR G. BRIGGS, *Acting Assistant Adjutant General of Artillery.*

MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*

MAJOR G. ROWLANDSON, *Director Artillery Depot.*

MAJOR J. D. MEIN, *Commanding A. Troop Horse Artillery.*

CAPTAIN A. V. FALLS, *5th d. d. 2d Battalion Artillery.*

ARTICLE 745.

ABSTRACTS OF ORDERS AFFECTING THE ORDNANCE AND ORDNANCE EQUIPMENTS OF THE ROYAL ARMY,—IN CONTINUATION OF THE PAPERS FURNISHED BY CAPTAIN HUTCHINSON.

The Military Board forwards for submission to the Artillery Select Committee, copy of Extracts of Minutes of Consultation of Government No. 806 of 10th March 1857, and letter No. 323 of 2d Idem from Military Board to Government on Abstract of Orders affecting the Ordnance and Ordnance Equipments of the Royal Army as follows, the same to be considered in continuation of papers formerly forwarded by Captain Hutchinson.

- 29th December 1852. 1. *Account of Additions &c. in the Ordnance, Ammunition, Carriages &c., adopted in the Royal Army since last Return.*
- 10th October 1853. 2. Do. do. do.
- 31st January 1855. 3. Do. do. do.
- 22d October 1855. 4. Do. do. do.
- 30th June 1856. 5. Do. do. do.
- 17th September 1852. 6. *Report of Trials of Addison's Furnace for heating shot.*
- 18th May 1855. 7. *Alterations in charges of Heavy Guns.*
- 17th February 1853. 8. *Report of Committee to consider the best arrangements for Coast Batteries.*
- 18th September 1855. 9. *Regarding improvement in Shells and Fuzes, and fitting of spring locks to Ammunition Boxes.*
- 21st February 1856. 10. *Copy of letter approving of Captain Boxer's mode of securing live Shells by metal screw plugs.*
- (a) No. 806, 10th March 1857. 11. *Extract from Minutes of Consultation.*^(a)

MILITARY DEPARTMENT.

No. 806.

Extract from the Minutes of Consultation, 10th March 1857.

Read the following letter.

No. 323.

From the Military Board to the Secretary to Government Military Department.

SIR,—With reference to Minutes of Consultation No. 363, of 2d February 1857, forwarding a letter from the Ho-

Note.—The above Documents numbered from 1 to 10 will be published in the Madras Artillery Records in continuation of the subject "Papers from Woolwich."

norable Court of Directors No. 137, of 17th December 1856, giving Abstracts of Orders (not the full and complete order) affecting the Ordnance and Ordnance Equipments of the Royal Army, we have the honor to express our acknowledgments for this useful paper, and to offer the following suggestions on the orders of the Board of Ordnance, as set forth in documents approved by Board 24th June 1853, $\frac{M}{316}$.

1. *Friction Tubes*.—The means of preparing these useful Tubes long promised by the Honorable Court, but no information yet of Machinery being sent.

2. *Shrapnel Shells for 56 and 42 Pdr. Guns*.—Supplies needed also for 68 Pounds of 95 cwt. of a higher gauge than those of the 8 inch Pieces.

5. *New pattern ammunition box for 500 rounds of Musket or Minie Percussion Ball Cartridges*.—A pattern to be sent from Home.

6. *Improved Store Cart*.—A pattern or drawing to be obtained and sent to India.

8. *Shrapnel Fuzes*.—A small box containing five of each sort to be sent to Madras.

9. *Friction Tubes, Tozer's Pattern*.—A supply to be sent,—pattern to be described in detail and means of making up supplied.

On the Board of Ordnance Orders dated 10th Octr. 1853, $\frac{M}{2183}$, we observe the following.

13. *Lanyards for Tozer's Friction Tubes*.—To be sent complete with the supply of Tubes adverted to in No. 9.

On the Board's Order of 31st January 1855 $\frac{55-D}{149}$.

10. *Bellows for Forge Waggon*s.—A supply of 50 to be sent out to Madras.

11. *Powder Cases*.—One as a pattern to be sent to Madras.

24. *Portable Forge and Pack saddle*.—50 Forges to be sent, and one pattern pack.

25. *10 Inch Iron Howitzer of 125 cwt.*—Two to be supplied complete with Equipments, Projectiles.

27. *Small Arm Ammunition Waggon packed with Intrenching Tools*.—One as a pattern to be sent to Madras.

On the Board of Ordnance order 22d October 1855.

250	12—55	<u>H. & S.</u>
		3292

3. *Sling Waggon with Windlas*.—A pattern to be sent to Madras.

5. *Carriages to be fitted with India Rubber Springs*.—A Carriage to be obtained so fitted and sent to Madras.

6. *India Rubber rings for elevating screws of Field Ordnance*.—A supply to be sent out with instructions how to prepare.

7. *New Forge Waggon*.—One to be sent to Madras.

8. *India Rubber springs for Carriages generally in the Service*.—A supply of different kinds to be sent and details as to mode of preparing.

10. *Bothway's Blocks*.—A supply to be sent.

11. *New stretcher for use of an Army in the Field*.—One to be sent.

14. *Spring spikes*.—Patterns to be sent.

20. *New Siege Platform*.—A pattern to be sent.

On the War Department's orders of 30th June 1856.

3. *Cappe's Patent day light Reflectors for Powder Magazines*.—25 to be sent to Madras.

10. *Alterations in Felloes and Tenons of Spokes for Wheels*.—Patterns to be sent to Madras.

13. *New method of igniting signal and long lights*.—Method to be described.

The figures in the above correspond with those in the several orders quoted.—We hope that the Honorable Court will be pleased to arrange for the regular transmission of the orders as issued to the Royal Army, and as early as possible,

also to send out patterns of articles altered, improved, or introduced.

I have &c.

(Signed) *Æ. SHIRREFF, Brigadier,
Commandant of Artillery.*

(Signed) *G. BALFOUR, Lieut. Col.,
Stipendiary Member.*

MILITARY BOARD OFFICE, }
FORT ST. GEORGE, }
2d March 1857.

Ordered to be forwarded to the Honorable Court for their consideration.

(True Extract and Copy.)

(Signed) *C. A. BROWN, Colonel,
To the Military Board. Secretary to Government.*

OPINION.—The Committee observe, that the Despatch of the Honorable Court of Directors having already been disposed of by the (late) Military Board, and their reply forwarded to the Honorable Court, they do not consider that any good would be now derived from any reconsideration on their part, of the various subjects contained in the Despatch.

ARTICLE 746.

ON UNIFORMITY IN THE CONSTRUCTION OF GARRISON CARRIAGES AND PLATFORMS.

(a) Extract from Proceedings No. 7476, 12th March 1857.

The Military Board referring the above question to the Artillery Select Committee suggests^(a) "that it would simplify the Garrison equipments, if the Carriages and Platforms of all calibres were alike as far as possible for all pieces from 32 pdrs. and upwards, and that the Platforms above all should be exactly the same;" the subject is laid before the Select Committee by order of the Com-

(b) Meeting 192, Article 732 page 518 in Artillery Records.

mandant of Artillery, with reference to former Proceedings^(b) on the subject of Garrison Platforms.

OPINION.—The Committee do not feel themselves in possession of sufficient data to enable them to determine, on the present occasion, on so important a question, but propose to reconsider it at their next Meeting, and decide that meanwhile, the Secretary be requested to procure all the necessary details of measurements and weights which bear upon the two fold question of uniformity of Carriages and Platforms, or of Platforms only.

ARTICLE 747.

ON THE SUPPLY OF CERTAIN ARTICLES OF EQUIPMENT TO BATTERIES &c. OF ARTILLERY.

The Military Board forward for submission to the Artillery Select Committee, correspondence regarding the supply of Shot and Shell metal gauges, and spare elevating screws and boxes for Field Batteries, and a proportion of Artificers Tools for Post Guns, as sanctioned by the Honorable the Court of Directors for the Field Batteries of Artillery throughout India.

(a) No. 355, 13th March
1857.

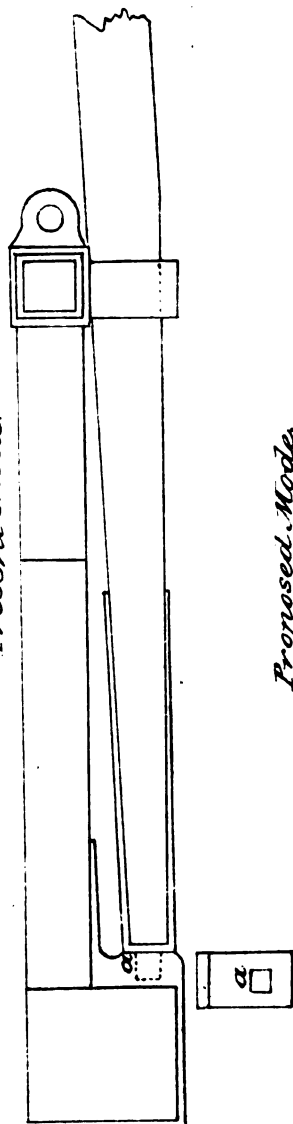
1. *Letter^(a) from the Secretary to Government of India Military Department, to the Inspector General of Ordnance Fort William.*—Transmits Extract (para 11) of Military letter from the Honorable the Court of Directors to the Government of India No. 12, dated 2d January 1857, and requests that in communication with the proper Officers at Madras and Bombay, he will forward to those Presidencies a supply of metal gauges, spare elevating screws and box, and Artificers Tools for the use of the Artillery at those Presidencies.

(b) No. 9547, 18th March
1857.

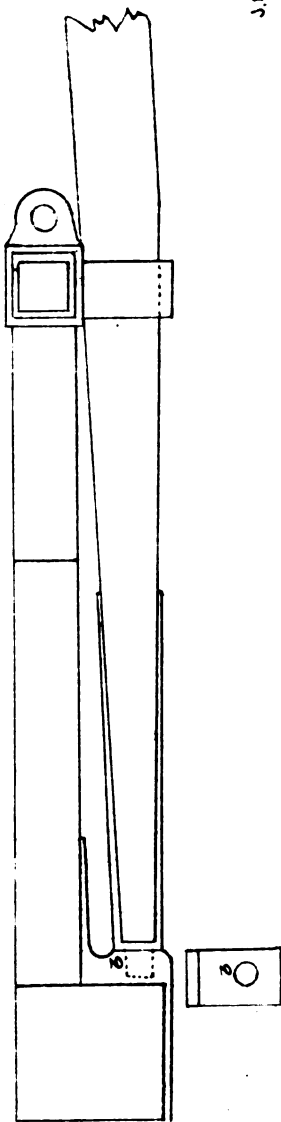
2. *Letter^(b) from the Inspector General of Ordnance Fort William to the Secretary Military Board Madras.*—Annexes copy of the above letter, and observes that with regard to the Elevating screws, those with guns having failed very often of late, it was deemed necessary to allow two spare instead of one for the Gun Carria-

Sketch shewing the mode of fixing the Pole to the
Limber of L. & F. Carriages, proposed by Major Maitland, Sur^t G.C.

Present Mode.



Proposed Mode.



Artillery Select Committee.

Page. 556.

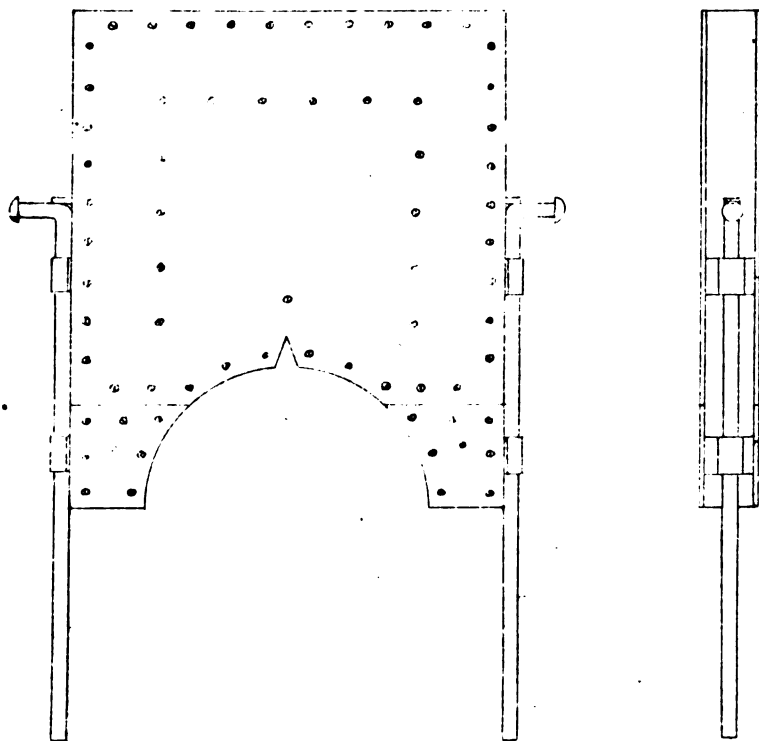
Meeting 194. Article 749.

Plate. 10

*Sketch of a Frontlet made up at the
Grand Arsenal and submitted to the
Perm^{re} Art^y Select Com^{tee}.*

Front Elevation.

Side Elevation



ins. 12 6 0 7 2 Feet

Madras Art'y. Depot.

W.E.

Artillery Select Committee.

Page. 556.

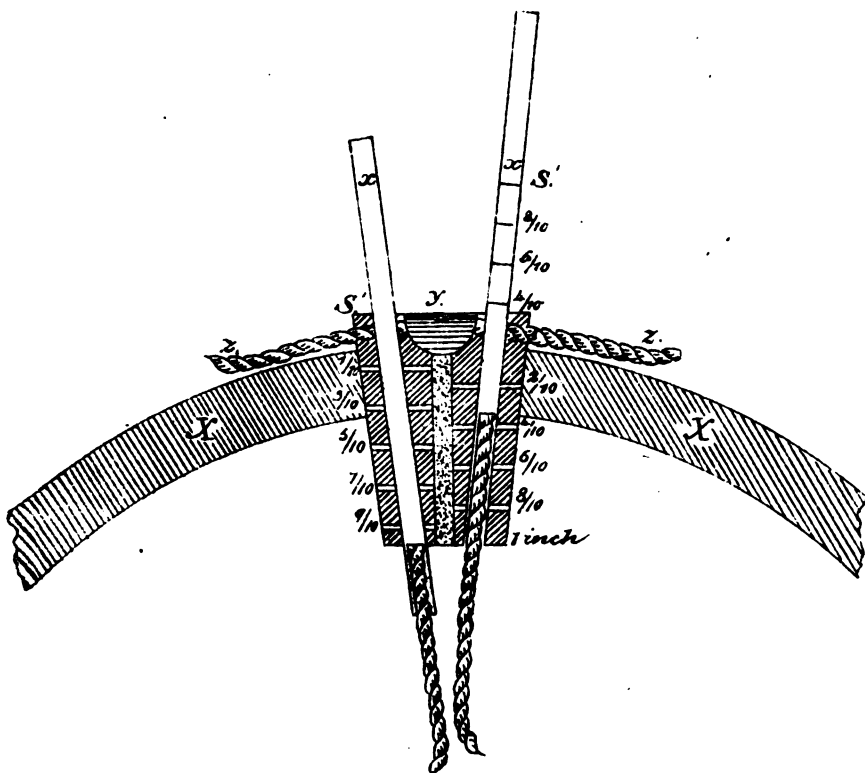
Meeting 194, Article 750

Pla 2

Fuze proposed by Lieutenant M.C. Lawson.

Section of Fuze.

fixed in Shell to burn $\frac{4}{10}$ of an Inch.



X. The Shell.

x.x. Two Plugs.

y. Meuled Powder.

*z.z. Strands of quick-match laid in
two notches which are cut in Fuze-
cup.*

ges of Troops and Batteries.—States that the 9 and 6 pounder guns in Bengal have Elevating Screws attached to their cascables.—Not supposed to be necessary to send either Gauges, Elevating Screws, or Tools from Bengal.

(c) No. 8038, 2d April
1857.

3. *Letter^(c) from the Secretary Military Board Madras to the Inspector General of Ordnance Fort William.*—Acknowledges receipt of the foregoing letters, and states that the questions will be referred to the Artillery Select Committee. That failures in elevating screws and brass boxes are so rare in the Madras Presidency, as to render any special record unnecessary. Not aware of any necessity for adding Gauges for Shot and Shell to the equipments of Light Field Batteries, every effort being made to have Projectiles gauged, and the most efficient served out to Field Batteries. Observes with regard to Tools for batteries, that the system of the Madras Presidency, requiring the Government to maintain the Battery equipments, and there being no contingent Gun allowance as in Bengal and Bombay, causes a different system to prevail to that in the other Artilleries.

OPINION.—The Committee entirely concur in the views expressed in the letter No. 8038 from the (late) Military Board to the Inspector General of Ordnance Bengal, on the several points referred to in this Article. The Madras Artillery use the Capstan headed Elevating Screw unattached to the Cascable, and failures from fracture are almost unknown.

ARTICLE 748.

ON A PROPOSED ALTERATION IN THE METHOD OF FIXING THE POLE OF LIGHT FIELD LIMBERS.—PLATE 104.

(a) Extract from, Proceedings No. 8163, 7th April 1857.

The Military Board forward^(a) the undementioned document for the opinion of the Select Committee, relative to an alteration in the mode of fixing the Pole of Light Field Limbers, suggested by the Superintendent Gun Carriage Manufactory.

(b) No. 268, 3d April
1857.

Letter^(b) from the Superintendent Gun Carriage Manufactory, to the Secretary to the Military Board, with a sketch shewing the proposed alteration ; which consists in the hole in the centre band to steady the pole, as well as the iron point at the end of the pole being made round instead of square as at present ; by which a saving of labour will be effected.

A pole with band altered in the manner proposed is laid before the Committee.

OPINION.—The Committee consider there is no objection to the alteration, which has simplicity and saving of labour in its favor, and recommend its adoption ; but to prevent weakening the part, advise a slight increase to the diameter of the hole.

ARTICLE 749.

ON A FRONTLET OR MANTLET TO BE USED WITH HEAVY GUNS.—PLATE 105.

(a) Letter No. 1143, 12th
May 1857.

(b) Extract from Pro-
ceedings No. 1767, 10th
July 1856

The Principal Commissary of Ordnance forwards^(a) a Frontlet or Mantlet which had been made up in the Grand Arsenal by order of the Military Board^(b), with a view to the same being submitted to the Select Committee.

OPINION.—This Frontlet has been proved by being fired into at 100 yards from Colonel Jacob's Rifle with iron pointed bullets, and will doubtless fully answer the purpose for which it is constructed.

ARTICLE 750.

ON TWO DESCRIPTIONS OF FUZES PROPOSED BY LIEUTENANT M. C. LAWSON.—PLATES 106 AND 107.

Two descriptions of Fuzes proposed by Lieutenant M. C. Lawson one to be set to any flight after the fuze has been driven home in the shell, the other a modification of Boxer's

fuze submitted for the opinion of the Select Committee, by order of the Brigadier Commandant of Artillery.

Descriptions and specimens of the Fuzes are laid before the Committee.

Description of a Fuze proposed by Lieutenant M. C. Lawson Artillery, to be set to any flight after the Fuze is driven home in the shell. Plate 106.

This Fuze, as in Captain Boxer's pattern, has holes bored on each side as far as the composition, the even tenths on one side and the uneven on the other; also two channels communicating with these holes down the whole length of the fuze, which is cut off to the length of one inch, and rasped so as to fit the neck of the shell. In the two channels are placed plugs of Teakwood, fitting so as to be easily moved up and down, but at the same time to have no chance of slipping. The plugs are then placed in the channels so that the commencement of the quickmatch (or any composition) for which there is a groove, may coincide with the bottom of the composition in the fuze; then, taking care to keep it in this position, holes are made in the plug at each two-tenths by pricking it at the holes already made in the side of the fuze, as also at the place where the plug projects from the top of the fuze. The same is done with the other plug. The plugs are then taken out and the distance of the lowest $\frac{1}{2}$ from the point (S') where the plug projects from the top of the fuze, is measured off and marked $\frac{1}{10}$, $\frac{2}{10}$ and so on, the other plug is marked in the same way $\frac{2}{10}$, $\frac{1}{10}$ &c., after this the fuze may be driven home and the plugs inserted so that (S') coincides with the top of the fuze. Suppose $\frac{4}{10}$ of fuze to be required;—the plug marked $\frac{4}{10}$ is raised until that mark appears even with the top of the fuze, which will bring the quickmatch opposite the hole at $\frac{4}{10}$ bored in the side, and on the fire arriving at $\frac{4}{10}$ it will ignite the match and instantly communicate with the bursting charge. The other plug which is not used, is fixed so that the top of its quickmatch shall be lower than the inch. The quickmatch

can be fixed in its groove by bees wax, gum &c. When the fuze is set, the projecting ends of the plugs are sawn off level with the top of the fuze, and bees wax put on to prevent the fire from entering the channels.

Description of a Fuze proposed by Lieutenant M. C. Lawson, Artillery. Plate 107.

This Fuze is bored, as in Captain Boxer's Fuzes, on both sides at even and odd tenths respectively. Two grooves extend along the outer openings from the 1st tenth to the bottom of the Fuze. To set this Fuze, supposing $\frac{1}{10}$ is required, bees wax is placed in the groove over the holes at $\frac{1}{10}$ and $\frac{3}{10}$, also at $\frac{1}{10}$ and $\frac{4}{10}$ on the opposite side to prevent the escape of flame, and a piece of quickmatch about one inch long introduced at the $\frac{1}{10}$ hole, allowing it to rest in the groove and project into the bursting charge; the groove should be sufficiently deep to prevent the rubbing of the match against the neck of the shell when the fuze is being driven in.

Report of Experiments made at Artillery Head Quarters with Experimental Fuzes, proposed by Lieutenant M. C. Lawson:—One description of Fuze with grooves cut in the sides into which strands of Quickmatch are introduced to communicate fire to the Shell; the other with holes bored on each side of the Fuze, and graduated plugs inserted to regulate the length of Fuze required after setting.

Six Fuzes of each description were set in 24 Pdr. Shells, and gave the following results when tested on the ground.

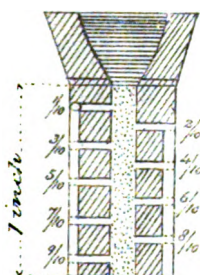
Fuzes set with Quick Match.							Fuzes with graduated Plugs.						
No. of Fuzes.	Length of Fuze.		Correct time of burning.		Time at which they actually started.		No. of Fuzes.	Length of Fuze.		Correct time of burning.		Time at which they actually started.	
	ins.	ths.	S.	P.	S.	P.		ins.	ths.	S.	P.	S.	P.
1	..	3	1	30	1	30	1	..	4	2	..	2	..
2	..	3	1	30	1	15	2	..	6	3	..	3	..
3	..	5	2	30	2	15	3	..	5	2	30	2	30
4	..	5	2	30	3	..	4	..	8	4	..	5	..
5	..	6	3	..	3	..	5	..	7	3	30	3	..
6	..	8	4	..	4	..	6	..	4	2	..	3	..

Artillery Select Committee.

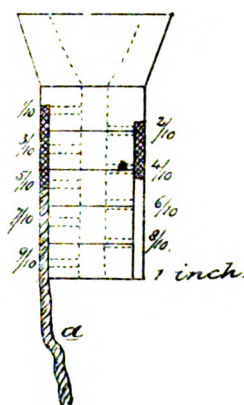
Meeting 19th, Article 750.

Light Field Spherical Case Shot & Shell
Fuze, proposed by Lieut^t M.C. Lawson.

Section.



Elevation.



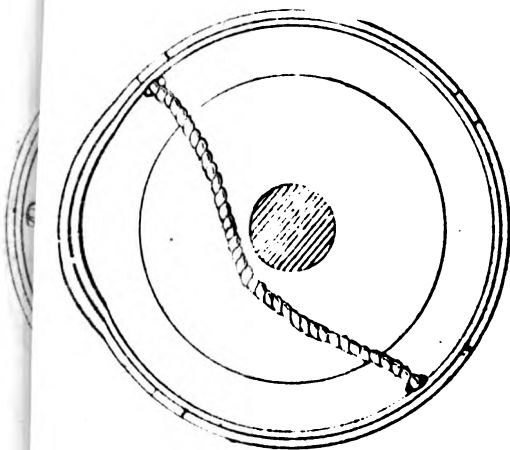
In the Section, the unshaded spaces are the grooves on two sides of the Fuze and the holes, at each tenth (marked) reaching to the composition.

In the Elevation the dark cross-shading represents the grooves filled up to $\frac{5}{10}$ ^{ths} and *a* the quick-match inserted at $\frac{5}{10}$ ^{ths} and reaching down the groove into the bursting charge in Shell.

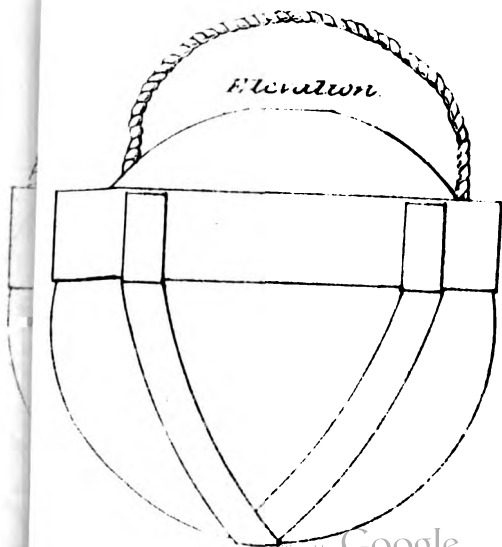
Mrimets to Shot & Shell.

*Tin collar attached
with Tin Straps.*

Plan



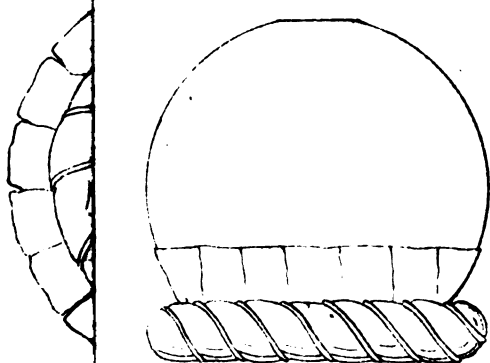
Elevation



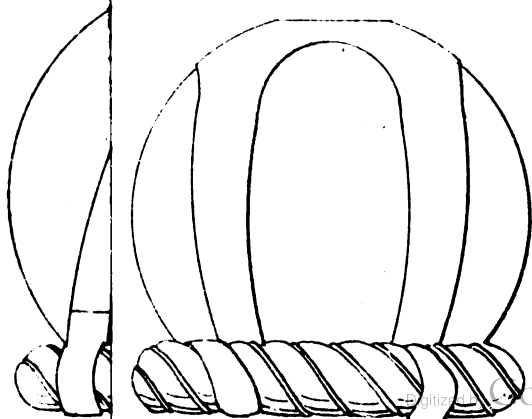
Metamets to Shot & Shell.

*Grummet stitched to canvas or
sheepskin cup & cemented to shell.*

Elevation.



*Grummet attached
with Sheepskin.
Elevation.*



The following rounds were fired from 24 Pdr. Howitzers with Service Charge at the Practice ground on the 20th May 1857, and gave the following results.

Fuzes set with Quick Match.										Fuzes with graduated Plugs.									
No. of Fuzes.	Distance to which set.		Elevation.		Length of Fuze.		Correct time of burning.		Remarks.		No. of Fuzes.	Distance to which set.		Elevation.		Length of Fuze.		Correct time of burning.	
	yds.		D.	M.	ins.	ths.	S.	P.				yds.		D.	M.	ins.	ths.	S.	P.
1	600		1	45	...	3	1	30			1	600		1	45	...	3	1	30
2	700		2	45	...	4	2	...			2	...		...	...	...	...	...	...
3	...		...	...	...	...	...	...	Did not start.		3	700		2	15	...	4	2	...
4	800		2	45	...	5	2	30	Did not start.		4	800		2	45	...	5	2	30
5	...		...	...	...	...	...	...	Did not start.		5	...		...	...	...	...	...	...
6	...		...	...	...	...	...	...	...		6	...		...	...	...	...	...	...
7	600		1	45	...	3	1	30	150 yds. in front.		7	...		...	...	...	...	...	...
8	...		...	...	...	...	...	...	200		...		...	...	...	...	...	...	Did not start.

OPINION.—The Committee highly appreciate the ingenuity of these contrivances, which are theoretically good, and give a fair average result, when merely burnt in the shell; but both failed entirely when fired from Ordnance, one only out of 8 of each kind, burning accurately. They consider therefore that they require to be carried to a much greater state of perfection ere they could be adopted into the service.

ARTICLE 751.

ON THE BEST METHOD OF SECURING TIN COLLARS AND GRUMMETS TO SHOT AND SHELL.—PLATE 108.

(a) Meeting 192 Article 1. In accordance with the recommendation of the Select Committee at a former Meeting,^(a) Experiments were carried on with Shells prepared in the several methods proposed, viz. with

Tin Collars attached with Cement.

„ „ „ „ Sheep skin.

„ „ „ „ Tin Straps,

the result of which is shewn in the accompanying Report (A.)

II. The following correspondence relative to a mode of fixing Grummets to shot, proposed by Captain T. H. Camp-

bell, Commissary of Ordnance Bangalore, is laid before the Committee.

(b) No. 6218, 27th January, 1857.

(c) No. 55, 23d January 1857.

1. *Extract^(b) from the Proceedings of the Military Board.*—Refers for the consideration of the Brigadier Commandant of Artillery letter^(c) from Captain T. H. Campbell, Commissary of Ordnance at Bangalore, notifying his having caused a few projectiles to be Grummetted on a plan which he thinks likely to answer all requirements, and sent them to the Officer Commanding Artillery in Mysore for experiment during the Annual Practice, and intimates the despatch of two Spherical Case Shot 6 Pdr: Grummetted on the same principle for the Board's inspection.

(d) No. 162, 17th April 1857.

2. *Letter^(d) from the Director Artillery Depôt to the Officer Commanding Horse Brigade.*—Requests that when forwarding his Report of all the trials with experimental Grummets, he will have the goodness to obtain and forward the methods by which attached, and the nature of cement and materials &c. used.

(e) No. 320, 22d April 1857.

3. *Letter^(e) from the Officer Commanding Artillery Mysore Division to the Director Artillery Depôt.*—Forwards copy of a report from Captain (Major) Eaton on a proposed system of Grummetting carried on at Artillery Practice at Bangalore, and copy of Memo. of Experiments carried on at the Arsenal, and states that, at the request of the Commissary of Ordnance he delayed making his report at the time, until he had made a test as requested by that Officer, who represented the Grummets sent to the Practice as having been hurriedly made up by inexperienced hands. The test to which ten 12 Pdr. Shells and ten 6 pdr. Spherical Case Shot were submitted was as follows :—

“ Half of each were carefully packed in the Gun Limbers of each Troop, and taken out at all Drills and Exercises, including several days of cross country work, for one month. At the end of that time none of them had suffered in the least

degree. Some were then exposed for two days to the sun, without any detriment, but one hour's rain subsequently, during which they were placed outside and exposed to its influence, rendered the dammer soft and pulpy and therefore made them unserviceable. Under these circumstances therefore I am not prepared to recommend the adoption of this new system of grummetting, until it has been tested by a good long march, in hot and wet weather, or in crossing Rivers when the Limber Boxes might become wet, from what I have seen as yet, I am by no means of opinion that the new is an improvement altogether on the old system of grummetting."

Letter from Captain (Major) G. P. Eaton Commanding C. Troop Horse Artillery to the Staff Officer Artillery Mysore Division, dated Bangalore 13th February 1857.

"Sir,—I have the honor to forward my report on the shells* which have been new grummetted agreeably to instructions from the Military Board, and sent to the Practice ground for trial.

9th February.—Two rounds of $5\frac{1}{2}$ Inch Shells were fired from a 24 Pdr. Howitzer, one with tin collar and one rope grummet, and the two 8 Inch Shells from 8 Inch Howitzer.

These shells all go easily into the bore of the Pieces.

Several of these shells were taken up in the hand and turned round, of those rope grummetted with light dammer 2 came off easily, and 2 by dropping the shells on the ground.

Those, covered with darker rosin appeared to hold better; afterwards a 24 Pdr. Howitzer Limber was packed carefully with 16- $5\frac{1}{2}$ Inch shells and a 12 Pdr. Howitzer Limber, one box with 19- $4\frac{1}{2}$ sent from Arsenal, 2nd box with 19-12 Pdr. shells of service allotment of C. Troop, and the Limbers sent out with Troop at Horse Artillery Exercise on the 10th, and again on the 11th over some small nullahs—in unpacking them they were found as below.

• Shells Iron Common 8 Inch Number 12.			
" " "	$5\frac{1}{2}$	"	20.
" " "	$4\frac{1}{2}$	"	20.

24 Pdr.	}	16 shells—4 shells with Grummets off.	
Howitzer		2 „ stitching partly loosened.	
Limber.	}	10 „ in good order.	
12 Pdr.			
Howitzer	}	one } 19 shells	New pattern. } 4 shells grummetting loosened.
Limber.		box } shells	
			4 „ stitching. „
			11 „ in good order. „
„	}	second } 19 shells	No damage received, except when the sheep skin was slightly rubbed from bad packing.
„		box } C. Troop.	

Thus it would appear the proposed new mode of grummetting is not as serviceable as that in common use. The 8 Inch shells were not thus tested, but these remarks on the remainder similarly grummetted may be deemed sufficient."

Memo of Experiments with Grummets sheep skin of the Old Pattern, and Grummets Canvas new pattern, in presence of Majors Burgoyne, and Eaton, Horse Artillery, and the Commissary of Ordnance :—

"10 Shells grummetted with sheep skin 12 Pdr. old Pattern.

5 do. Canvas grummetted new Pattern 12 Pdr.

5 do. „ „ „ „ 6 Pdr.,

were put at the same time in the shot cleaner, which was turned rapidly for one minute, with the following result.

	Serviceable.	Unserviceable.
10 Shells grummetted sheep skin		
12 Pdr. old Pattern.....	2	8
10 Shells grummetted, Canvas new		
Pattern 12 and 6 Pdr.....	10	„

(Note.) Six of the sheep skin Grummets were altogether off, two quite destroyed though not quite off, and two slightly injured.

The Canvas grummets were all quite good and unhurt, excepting two slightly loosened at the edges.

A 12 Pdr. Shell with old pattern sheep skin Grummet was fastened by the grummet to a rope about 10 yards long, the other end was then fastened to a tree, and the shell thrown from the tree with a man's full strength; on the shell being checked by the rope, the Grummet gave way altogether.

The same process was tried with a 12 Pdr. shell grummetted with Canvas new pattern, and repeated several times without the least injury to the Grummet.

An Eight Inch shell with new Pattern Canvas grummet has now been suspended in the Arsenal by a rope attached to the grummet since the 9th of last month, without the least injury, it is filled with leaden balls and weighs 61 lbs., and is as good on this the 30th day of suspension as when first put up.

(Signed) T. H. CAMPBELL, (Captain,) *Commissary of Ordnance.*

ARSENAL, BANGALORE, 8th April 1857.

(f) No. 331, 25th April 1857. 4. *Letter^d from the Commissary of Ordnance Bangalore to the Director Artillery Depot.*—Forwards information regarding the construction of the experimental Grummets, and thinks it would be no more than fair, should it be intended to give the grummets a trial at Artillery Head Quarters, that he be allowed to make up those to be tested,

CONSTRUCTION.

“The ordinary Rope Grummet is stitched to a piece of Canvas cut in a circular form, rather less than is required to cover half the projectile to be grummetted, the canvas is then notched round the edges, Double or Triple “Europe Twine fine” well waxed is used for sewing on the Grummets, and care must be taken not to sew them too tight, or the canvas will not fit close to the shell, a sample grummet is herewith sent.

The Cement is made in the proportion of 3 ounces of glue to 3 ozs. rosin.

The Glue being pounded is melted in the ordinary glue pot with one gill of water.

The Rosin being pounded and sifted is made into a thick paste with about $\frac{1}{8}$ of a dram of Linseed oil, this paste is then stirred into the hot glue, it melts and mixes with the glue immediately, and is ready for use in about four or five minutes.

The shells, having been previously very carefully cleaned,

are put on a board provided with plugs to fit the Fuze hole, and the inside of the canvas being completely covered with the *hot* Cement, applied by means of an ordinary Paint Brush, and a portion being also rubbed over the bottom of the shell, the two are put together; the grummet is then firmly pressed down, and the canvas fitted to the shell with the finger, the ends of the canvas must not be too much stretched or they may draw up when the cement becomes cold, the cement hardens immediately.

The shells to be grummetted must have the old lacquer or paint burned off, and then be thoroughly cleaned or the cement cannot be depended upon.

If it is considered advisable to render the grummets more water proof, the canvas may be covered with a coating of white lead and Linseed oil, after the cement has been allowed to harden for two or three days.

(g) No. 183, 29th April 1857. 5. *Letter^(g) from the Director Artillery*

Depôt to the Officer Commanding Horse Brigade.—Acknowledges receipt of letter No. 320, of 22d April 1857 and its accompaniments, and states that the Commandant concurs in the opinion expressed by Major Eaton, and confirmed by his (Major Burgoyne's) own reports of the proposed mode of fixing Grummets having no sufficient superiority, to recommend them over the present.

“The present mode of fixing wooden bottoms and grummets by sheep skin and tin straps has become objectionable because of the greatly reduced windage recently introduced, which, with high gauge new shells, will not admit of their introduction, if so fitted, after the piece fouls a little.”

“There are three points indispensable to success in finding a perfect substitute: 1st, to leave the diameter of the projectile unaugmented.—2d, to secure the grummet sufficiently strong to bear travelling on service, and 3d not so strong as to prevent its being separated from the shell on discharge from the piece.”

2. "The Tin Collars used in Bengal are liable to this defect, several shells have been picked up with the collars still adhering to them, and others frequently displaced in travelling and softening of the cement by heat &c."

III. A Memorandum of Experiments, carried on at Artillery Head Quarters with shot grummetted as proposed by Captain Campbell is laid before the Committee (B.)

IV. Specimens of shells were produced before the Committee having Grummets fixed with Tin straps and with sheep skin, also stitched to canvas and leather cemented to the Shells in three different methods (Capt. Campbell's), also with Tin Collars soldered (instead of with cement to the shell, suggested by Serjeant Instructor White of the Artillery Depôt) and with wooden bottoms fastened by a copper headed rivet as used in the Royal Artillery, as learnt by Foreman Forsyth of the Gun Carriage Manufactory at Woolwich.

OPINION—The Committee are of opinion that of all the various patterns of Collars, Grummets, and Bottoms before them, the result of Experiments shows that disadvantages, more or less counterbalance the advantages respectively proposed by their projectors, as regards those that have been tried by firing; but the pattern of Bottom in use with the Royal Artillery, as shewn in the specimens before the Committee, prepared by Foreman Forsyth of the Gun Carriage Manufactory, and submitted by the Superintendent of the Gun Carriage Manufactory, appears the best adapted to the present reduced windage, and they recommend that a sufficient number be prepared, and a fair trial to be given to them, and also a more extended trial to Captain Campbell's suggestion for Grummets.

[illegible]

ARTILLERY DEPOT, ST. THOMAS' MOUNT, }
21st May 1857.

(Signed) G. ROWLANDSON, Major,
Director Artillery Depot.

B.

MEMORANDUM.

The following Experiments were made at the Artillery Depôt with shot grummetted according to a method, proposed by Captain T. H. Campbell, Commissary of Ordnance, Bangalore.

1. Six 6 Pdr. spherical case shot were placed in a Tub of Water on the night of the 15th May 1857, and remained in it 12 hours.—On examination, when taken out of the water, the grummetts were found apparently quite unaffected by the water, being firmly fixed to the shot, and could not be moved by the hand.—Five of the number were afterwards fired from a 6 Pdr. Gun with service charge,—three into a Butt of earth and two down the Range. When the former were recovered, the grummetts were off—but the Canvas of two remained partially adhering and hanging in tatters to the shells bottom—one was quite clear:—with the latter, the grummetts of both were gone, and the Canvas, partially in one, and entirely in the other case, separated from the shell.

2. Six shot were on a subsequent occasion fired to test other variations of the same mode of fixing the grummetts by the same Officer, the results of which are shewn in a Report of Practice on the 12th June 1857 attached to these Proceedings. (C.)

(Signed) G. ROWLANDSON, Major,
Director Artillery Depot.

ARTILLERY DEPOT,
SAINT THOMAS' MOUNT, }
13th June 1857.

(C.)

Report of Experiments carried on at Saint Thomas' Mount on the 12th June 1857, with Shells received from Captain T. H. Campbell Commissary of Ordnance Bangalore on the 9th June 1857, with Grummets attached by Canvas and Cement as explained below. The following result of the experiments was exhibited on the recovery of the Shells after firing.

2—12 Pdr. Shells with Grummets fixed as Collars and with bands of Canvas, only a little wider than the Grummet with the same description of Cement as before.	2—6 Pdr. S. C. Shot with Grummets fixed in the bottom of the shot, with bands of Canvas as in the 12 Pdr. shells.	2—6 Pdr. S. C. Shot with Grummets fixed with the same quantity of Canvas as used in the former method, but with cement of a less adhesive nature.
The above were fired from a 12 Pdr. Mountain Train Howitzer with service charge of 12 ozs.	The above were fired from a 6 Pdr. Gun, service charge 1½ lbs.	The above were fired from a 6 Pdr. Gun—service charge 1½ lbs.
The Grummets and Canvas were entirely blown away from the shells.	The Grummets of both shot were off; the canvas was gone, but thick coating of cement found adhering to them.	The Grummet and Canvas of one was clear off—the Canvas of the other was gone, but thick coating of cement found adhering.

ARTILLERY DEPOT, ST. THOMAS' MOUNT, }
12th June 1857.

(Signed) G. ROWLANDSON, Major,
Director Artillery Depot.

ARTICLE 752.

ON THREE UNSERVICEABLE BEAMS OF 6 PDR. CARRIAGES IN USE WITH THE B. TROOP HORSE ARTILLERY AT TRICHINOPOLY, WHICH HAD FAILED IN PROOF.

The Beams received from Trichinopoly are submitted for the inspection of the Select Committee, by order of the Inspector General of Ordnance,^(a) with a view to ascertain the cause of the defects.

The undermentioned correspondence relative to the failure of the Carriages is laid before the Committee.

(b) No. 149, 11th April 1857. 1. *Letter^(b) from the Officer Commanding Artillery Southern Division, Trichinopoly to the Director Artillery Depôt.*—Forwards proof Report of three 6 Pdr. Carriages, Nos. 4, 5, and 7, which having been injured at the Annual Practice, the trails were renewed in the Arsenal with half Beams of Saul wood dovetailed. Brings to notice that no seasoned half wrought cheeks were available in the Arsenal to replace one that had split, and suggests having a certain number of seasoned Half wrought 'Checks,' 'Axletree cases,' and other parts of Carriages in the Arsenal at Trichinopoly to meet the demands for the repairs of breakages &c.

(c) No. 163, 18th April 1857. 2. *Letter^(c) from the Commandant of Artillery to the Secretary to the Military Board.*—Forwards copy of the above proof Report, and recommends that carriage No. 4, the trail of which has a small crack underneath at the perforation for the Elevating screw, be subjected to further extra proof to a limited extent. Begs to point the particular attention of the Board to the remark in the Report on Carriage No. 7 "flaws which have been filled with composition," which practice he conceives is wholly inadmissible in the construction of Gun Carriages requiring the utmost degree of efficiency, for the protection of the highest interests of the service, and it may therefore

appear worthy of the Board's prohibitory instructions to all Departments where Gun Carriages are made or repaired, in order that no wood may ever be used which can require any sort of composition to fill up or conceal flaws or defects. Strongly concurs in the recommendation, that supplies of seasoned half wroughts be at all times maintained in all Arsenals having Ordnance Carriages dependent on them.

(d) No. 8468, 23d April 1857. 3. *Extract^(d) from the Proceedings of the Military Board.*—Requests such further proofs to be made as may appear requisite to test the state of the Carriages. That a careful report be made as to the “filling up with composition” of such cracks as may have existed in the beam or cheeks. The Board will be happy to lay in a stock of Beams and Cheeks, and will be obliged by the Brigadier Commandant of Artillery stating the quantities for the several Arsenals;—But do not think it an advisable measure, from the difficulty of maintaining a stock of good half wroughts in an efficient state.

(e) No. 184. 30th April 1857. 4. *Letter^(e) from the Director Artillery Depot to the Officer Commanding Artillery Southern Division.*—Forwards copy of the preceeding Extract and requests No. 4 Carriage may be subjected to such further proof of a limited extent, as will test the nature of the crack. Invites opinion of what allotment of half wroughts it is proposed to be kept in the Trichinopoly Arsenal.

OPINION.—The Committee consider it advisable that the beams be cut up into sections and subjected to Barlow's test, and also that the specific gravity be ascertained and the results submitted at their next Meeting. These experiments they recommend being conducted at the Artillery Dépôt in the presence of the Committee.

ARTICLE 753.

IMPROVED METHOD OF FIXING ON THE FRICTION PLATE TO THE AXLETREE CASE, SUGGESTED BY DEPUTY ASSISTANT COMMISSARY J. CURRAN.—PLATE 109.

(a) Extract from Proceedings No. 511, 22d May 1857.

(b) No. 368, 19th May 1857.

Submitted for the opinion of the Artillery Select Committee under instructions from the Inspector General of Ordnance.

Letter (b) from the Superintendent Gun Carriage Manufactory to the Inspector General of Ordnance, is laid before the Committee. Annexes copy of letter from Deputy Assistant Commissary J. Curran, suggesting an improved method of fitting on the friction plate to the ends of the Axletree Cases of Carriages, which consists in its being fitted on round, instead of square as at present, which only involves unnecessary labor, continuing the turning of the Arms in excess to its present length by the thickness of the friction plate, and having the hole in the plate made round instead of square.

OPINION.—The Committee see no objection to the alteration, which they recommend to be adopted for the reasons assigned by Mr. Curran, and brought forward by the Superintendent of the Gun Carriage Manufactory.

ARTICLE 754.

PROPOSED WROUGHT IRON COMPOSITE GUN, SUGGESTED BY LIEUTENANT H. D. GLOAG.—(PLATE 110.)

Submitted for the opinion of the Artillery Select Committee, by order of the Brigadier Commandant of Artillery.

The undermentioned documents are laid before the Committee.

* Plate 110. 1. *Description and Plans* of a Wrought Iron Composite Gun, proposed by Lieutenant Gloag.*

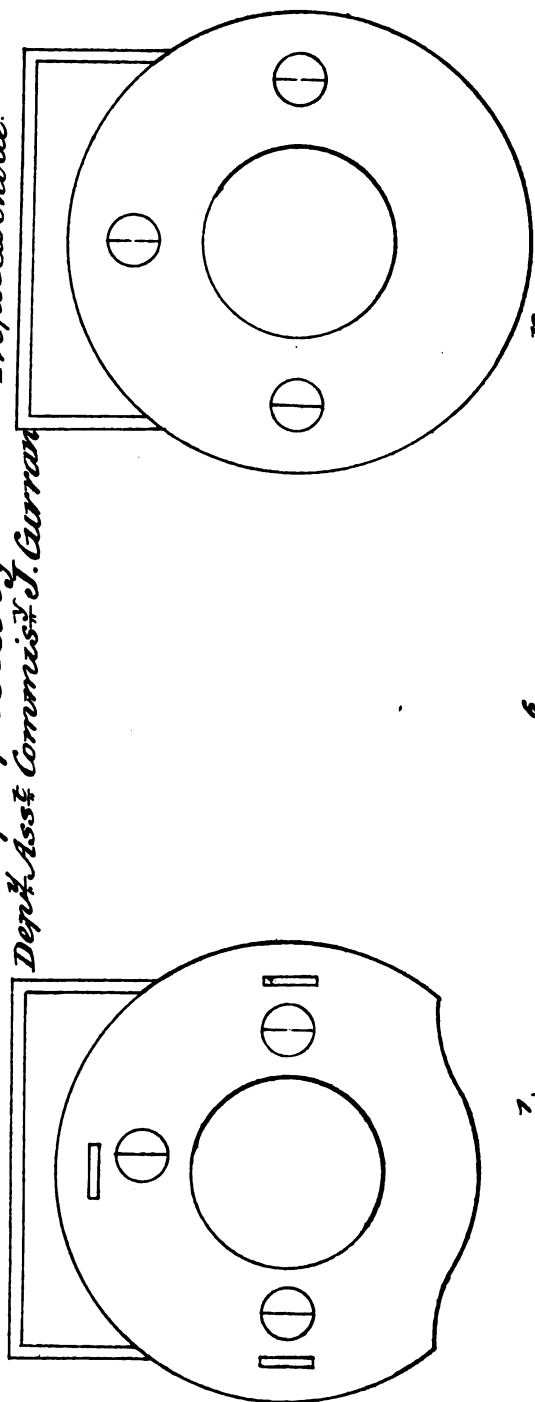
1. Supposing that wrought iron is the best, or at least a better material with which to construct guns than cast iron, and that a difficulty exists in working such masses of metal as are required to form cannon.

*New Method of fixing on the Friction Plate to the end
of Axletree Cases of L^{ts} & Fth Carriages;*

Present Mode

Proposed Mode.

Dep^y Asst^t Commis^r J. Gurnan



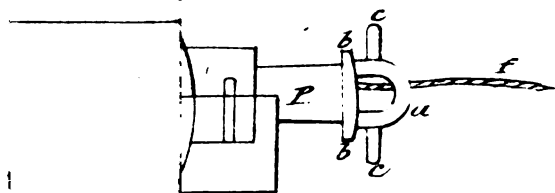
Drawn by J. Gurnan

12 ins.

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at Com *Plate 110*
4, Art
on Com
F.D G

n of Gun



2. The plan suggested shews a method of making guns in parts of such dimensions, so as to allow the iron to be thoroughly wrought, and consequently to be of close texture.

3. It is proposed to bring the barrel of the gun to a proper thickness, proportioned to the charges which may be intended to be used with the piece, by a series of hollow Frustums of right cones, fitting over each other, and coinciding exactly in all points, the outer surface of one with the interior of the other.

4. The advantages arising from this arrangement are, a greater facility in carrying, embarking, and disembarking guns; which are built in pieces such as seen in the plan.

Also the inner portion which forms the bore or any other part composing the gun, which may be injured by firing or otherwise, can be removed, and a new piece inserted.

5. The object of making the barrel of the gun proposed of several layers of metal fitting over each other is, as mentioned in para 2; but in guns of small calibre a single hollow Frustum may be sufficient to form the barrel—the thickness of metal required will of course be less than that of cast iron guns, in proportion to the allowed superiority of wrought iron over cast.

6. In proposing that a gun should be constructed as shewn in the plan, it is assumed that mechanical means have attained a great degree of perfection, and the forms of all the component parts of the gun are designed so as to admit of their being turned by machinery, that is, they are of those shapes which are easily turned, and not greater in size or weight than many of the parts of the machinery of a large Steam Frigate, the construction of which demand great skill, and the success in practice depending on the amount of accuracy displayed in their formation.

7. Sometime after the completion of the accompanying plan, I saw in the work mentioned in the margin, that Mr. Handyside had executed drawings of a mortar and cannon, to be made

Report of the British Association for the advancement of science, Glasgow 1855, page 107-108.

in parts; the material to be wrought iron; the following is the description given. "The mortar to be made of rings welded together, the whole to be turned and ground together, and them firmly bound by longitudinal bolts."

"The cannon to be made in a similar way, the part behind the trunnions slatted longitudinally and ringed."

"Mr. Handyside adopted this method in order to make use of wrought iron, as he conceives that they could not be made of it entire. He was led to this plan by having successfully made in this way an hydraulic press cylinder after a cast one had been broken. The forged one has stood for six years and is still sound, others made since in the same way have been equally successful."

Report &c. &c.
Page 108.

"The opinion given at page 108 of a built gun; is as follows"—

"It is questionable whether any built gun can long resist the violence of the explosion: and we believe that wrought iron is not the best material for heavy ordnance, nevertheless, in our opinion, Mr. Handyside's Gun and Mortar are constructed on a better principle than most we have yet seen."

8. Extracts from a letter from Mr. Cochran addressed to Mr. Fairbairn.

Reports &c. Page 101.

Extracts from a letter addressed to the Committee by Mr. James Nasmyth September 19th 1855.

"Mr. Nasmyth so well known as the inventor of the steam hammer, commences his letter by entering on the subject of the failure of iron malleable guns.

He states that those which are built of bars, welded together, are sure to be destroyed either sooner or later by the continued disruptive force of the explosion of powder in the chamber, that it is still a question whether with our present means of forging large masses of iron, we may not obtain powerful forged iron guns; but so great is the diffi-

culty of obtaining a sufficiently large mass of iron sound in every part, so great is the expense arising from the loss of material by oxidation, and such is the tendency to basaltic crystalization which the long continued heating produces, that Mr. Nasmyth comes to the conclusion, that powerful ordnance cannot be manufactured advantageously of malleable iron."

9. "Mr. J. B. Neilson, the inventor of the hot blast, who has had great experience in casting metals, recommended that guns, if made of wrought iron, should be forged upon a mandril in a series of rings, welded successively one upon another, till the required length is completed."

"He recommends that guns be cast hollow with cores artificially cooled."

10. Mr. Neilson's communication to the
Page 104. Mechanical section "on forging large masses of malleable iron, proved that the strength and other properties of wrought iron are seriously injured by repeated heatings, that there is a considerable loss by oxidation, and that the cost and risk are great. These considerations, and others arising from the physical properties of wrought iron, its ductility and want of elasticity, clearly show that it is not a material adopted for the construction of heavy ordnance."

11. "Mr. Joseph Whitworth, in a communication to the Committee dated Glasgow September 20th 1855, refers to a rifled cannon, which he is constructing in parts. It consists of three cast or wrought iron pieces bound together by wrought iron rings. The bore is nine sided, with the requisite pitch for imparting rotatory motion to the ball."

12. "Mr. Fulton in a communication to
Page 106. the Committee, dated Glasgow September 29th 1856, offers to undertake the forging of a wrought iron gun similar to Mr. Nasmyth's, and sends sketches of some very large forging he is making for Messrs. Scott, Russell and Co's great vessel, shewing what he is able to accomplish."

	tons.	cwts.	qrs.
" Paddle shafts supposed to be....	30	0	0 each.
Propeller shaft „ „	37	0	0
Intermediate shaft forged.....	28	13	1
• Crank forged.....	10	10	2
Crank finished.....	7	4	0
Friction strap.....	10	0	0"

13. The weight of the present 68 pdr. cast iron gun is 98 cwt., which is less than any of the forgings given in Para 12.

14. The gun proposed in the plan is not to be so large in bore as the guns of the present day ; the projectile intended to be used with it being of an oblong form, what is lost in weight, by decreasing the diameter of the bore, is gained easily by increasing the length of the projectile.

15. It will be seen from the above extracts, that wrought or malleable iron, is not considered applicable to the manufacture of heavy ordnance.

The failure of the cast iron Guns and Mortars in the late war, has been attributed by Mr. Cochran, to the inferiority of the metal, and to the defective manner of casting.

16. From the masses of iron which are stated in para 12, to be about the size of pieces which can be forged, there can be little doubt of the practicability of forging the different parts of the Gun proposed which is not intended to be greater in diameter of bore, 6.41, than a 32 Pdr. ; the object to be gained, is long range and accuracy of practice, both of which may be acquired without increasing the Bores, or having guns of 12 Inches.

17. Having in para 2 mentioned the object of making the barrel of the Gun of layers of metal fitting over each other ; and in para 4 the two principal advantages of such an arrangement being stated, there is another idea conveyed in the plan ; viz, that the gun should be loaded from the breech, the arrangement of the different parts and the method of loading, will be understood by inspecting the different figures in the plan submitted.

18. There are a great many objections to be brought against a breech loading cannon.

1st. The difficulty of making the different portions fit with such a degree of nicety and exactness, as to prevent the escape of any of the elastic fluid from the ignited charge at the breech.

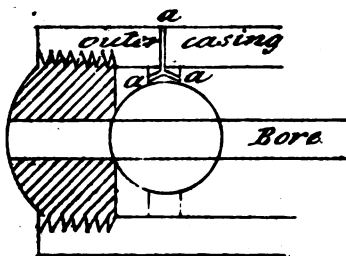
2d. That the constant jarring of the explosion will sooner or later loosen the parts, and render the gun unserviceable and dangerous.

3d. That the force which gives velocity to the ball, also acts on the breech which may therefore be blown out.

4th. That the gun being built, there will be a jarring in all the pieces, because the vibration caused in the metal by the explosion, is more in those pieces near the inner portion or chamber of the gun.

5th. That the inner frustrum which forms the bore, and those parts of the gun which compose the breech, will become much sooner heated than the outer parts.

19. By inspecting the section it will be perceived, that a considerable portion of the ball is in contact with the hemispherical hollow in the end of the barrel, and if a sufficient portion can be made to coincide closely, so as to admit the escape of very little of the fluid to generate by the ignition of the charge, and the ball be always kept well greased by mutton fat and bee's wax, poured through a small hole through the outer casing down the outer pivot in this form *a. a. a.*



which will cause the ball to work easily, and also in some degree prevent any of the fire from the charge escaping through any crevice which may be left by the non coincidence of the ball with the concave surface in the end of the breech, such crevice existing by reason of the inability to work with accuracy. The ball is held firmly in its position by the breech piece.

20. The breech of a musket is screwed into the barrel, so is the piece which fills up the breech of this gun, it must be of sufficient length to have a good hold, and must be screwed up to come in such close contact with the ring, that it cannot move, and as the ring holds the ball in its proper position, the breech is solid though composed of different parts, there is no pressure on the pivots or arms of the ball, nor is there any on the pin which passes across the gun through the ball at right angles to the bore, and which prevents the ball being moved round by the explosion.

21. The pin may be made hollow without diminishing its strength, and at the same time rendering it easier to be put in and taken out, as is requisite in loading and before firing.

22. If the breech piece is sufficiently strong to resist the explosive force of the ignited charge, and remains secure in its place, then this force cannot move the ball or ring from their position towards the breech, neither can they be moved towards the muzzle, on account of the shape of the pieces forming the barrel and the outer casing.

(Signed) HENRY DUNDAS GLOAG,

February 1857.

Lieut. Madras Artillery.

In former times cannon were made in parts. In Edinburgh castle there is a large gun composed of several pieces, and hooped with iron rings.

I think I have seen a matchlock barrel which was made of different parts bound together by rings.

2. *Memorandum by Captain C. H. Hutchinson on Lieut. Gloag's proposed Gun.*

MEMORANDUM.

Lieut. Gloag's Wrought Iron Composite Gun.

Notwithstanding the very ingenious combination of its parts, there are weak points in this gun, which would surely fail when submitted to the severe test of exploding gunpowder, but restricting myself within the limits assigned, I will confine the expression of my opinion to the subject of manufacture alone.

In order to secure mutual support, as well, as to prevent the entrance of the exploding gas between the cylinders, and the bursting of the outer ones at least, the parts would require to be fitted with perfect accuracy. Tubes of such a length would be difficult to weld soundly ;—they must then be bored conical on the inside, (not easy) turned outside, and carefully ground into each other ;—involving more difficulty than in forging a solid gun and boring it in the usual way. A solid 13 inch gun weighing 20 tons has been soundly forged and bored at Liverpool, and even larger guns, if required, could be so constructed. There is therefore no necessity for building iron guns of pieces.

(Signed) C. H. HUTCHINSON, Captain,

MADRAS, }
2d May 1857. }

Artillery,
Ex. Engr. 3d Class.

3. *Memorandum by Major G. W. Y. Simpson of objections to Wrought Iron Guns composed of separate pieces.*

1st. That the integrant portions of the gun cannot act together, with that concert of resistance, necessary to resist the force of the explosion, and that in every trial yet made of this description of gun, the parts have dislocated at the first discharge.

2d. That the internal effects of unequal expansions, consequent on the local heat generated by the inflamed powder, is more destructive to this kind of gun than to any other.

3d. That increased and highly destructive forms of corrosion must occur in such guns from the gases generated penetrating the junctions, especially from the action of Sulphuret of Potassium, and also Sulphate of Potassa and water, which the former is resolved into, by instant oxidation, both of which are highly corrosive and destructive to iron guns.

A wrought iron gun 6 pdr. was proved at Woolwich in July 1855, and burst at the first discharge:—in length and dimensions it very closely resembled the established pattern for the same class and calibre of gun.

The breech ring was forged on solid to the gun, but the trunnions had been forged separately and screwed into the gun; a slight reinforce of metal had been forged on the gun to receive the trunnion screws, which had threads nearly one inch pitch. The gun was formed by placing heavy bars of metal longitudinally and welding them together by continued longitudinal weldings. The breech also was welded in. The gun was then bored and turned; it presented an appearance of great strength and soundness. The gun split in half longitudinally when fired.

The following are some among many others, of the propositions submitted to Woolwich in 1855, for the construction of wrought iron guns.

1. Wrought iron guns of wire wrapped round an iron tube.
2. Wrought iron lined with tubular chase of bronze.
3. Bronze gun lined with wrought iron tubular chase.
4. Welded twisted barrels, formed by screwing into each other spirals of triangular section, one being reverse to the other, and then welding.
5. Wrought iron guns formed of plates wrapped upon itself or upon a central tube.

Dundas and Nasmyth submitted wrought iron guns:—all failed.

Messrs. Horsfall of Liverpool have forged a 13 inch calibre gun, $13\frac{1}{2}$ feet long, charge of powder 45 lbs., and weight of shot 300 lbs. This is the largest and most successful forging

ever executed ; it has stood the severest proofs and is a powerful piece of ordnance. This result proves that wrought iron guns may be manufactured, but with our present means and knowledge, at great cost and great uncertainty as to the result.

The breech arrangements in Mr. Gloag's gun are ingenious, but most certainly would never withstand the repeated shocks of a disturbing force, so enormous as that generated on the inflammation of gunpowder.

The first and greatest objection to a gun of this construction, of wrought iron, would be difficulty of welding, and fitting and grinding the parts together, and the still greater difficulty of then determining whether the welds were trustworthy or not.

Every wrought iron gun hitherto manufactured has failed, either in the cylinder, or in the breech arrangements, when the gun was constructed for breech loading.

The destructive effects of oxidation in wrought iron guns constitutes another and fatal objection.

That all that can be gained by the use of wrought iron for guns, is comprised in lightness and strength, that the former is in fact, not desirable, because unless the weight is, in field guns, to that of the shot at least as 140 to 1, and in battering guns as 200 to 1, the recoil is so great and inconvenient and so destructive to carriages, as to become impracticable of adoption.

That a given number of rounds fired from wrought iron guns has produced a greater enlargement of the bore in the ratio of nearly 2 to 1 than gun metal, and hence great windage, uncertainty of aim, reduced range &c.

That from a want of relative hardness in wrought iron, as compared with cast iron and gun metal, a serious amount of scoring from the passage of the shot is inevitable.

The above objections are those advanced by several Authorities on the subject of wrought iron guns.

(Signed) G. W. Y. SIMPSON, Major,
Madras, 3d May 1857. Artillery.

OPINION.—The Committee readily recognize the great ingenuity exhibited in the construction of this gun, and the professional spirit which has influenced Lieutenant Gloag in submitting these papers; but the Committee are of opinion that the difficulties in constructing a Wrought Iron Gun in sections, and with our present manufacturing means, are insurmountable. Every experiment carried on in England having the same object in view, corroborates this conclusion. The Committee will publish in the Records these interesting Papers and Plans.

ARTICLE 755.

ON THE EFFICIENCY OR OTHERWISE OF TIN WADS FOR PREVENTING THE LEADING OF RIFLES.

(a) Meeting 193 Article
737 Page 524 Artillery
Records.

Experiments having been carried on in accordance with the recommendation^(a) of the Select Committee, with tin wads proposed by Major T. H. Haly, the subject is again laid before the Committee for their opinion, by order of the Brigadier Commandant of Artillery.

Several of the tin wads proposed by Major T. H. Haly, recovered after the firing, are laid before the Committee.

OPINION.—The tin wads proposed to be used, were agreeably to the Proceedings of the last Meeting of the Committee, forwarded to Major Haly, and wads or discs, of the exact pattern approved by him, to the number of 85, have been since fired from the same Enfield Rifle in the course of Practice under the Director of the Artillery Depot, at the Mount, the result of which trial seems to establish.

1st. That the statement of the Officer Commanding H. M. 43d Regiment, that the discs do not flatten when fired, or penetrate the grooves of the Rifle, is supported by the condition of those picked up, which appear exactly the same as those not fired.

2nd. That the opinion of the Officer Commanding H. M. 74th Regiment, that they would reduce the Rifle to a smooth

bore, is not supported by these experiments, as not a sign of a scratch is perceptible in the bore, the breech of which having been removed, the barrel is placed before the Committee for inspection.

3rd. That the invariable effect of the disc is to fulfil the purpose contemplated of effectively clearing the fouling, whether from leading or powder, and apparently without any detriment to the barrel, so removing the serious objection experienced from the fouling, and instantly restoring the weapon to effective use. The Committee therefore strongly recommend these tin discs or wads being more extensively tried at the various Schools of Musketry, with a view to their final adoption, or rejection, for the Service.

ARTICLE 756.

ON THE FRACTURE OF THE REAR FOOT BOARDS OF FOUR AMMUNITION WAGGONS.

A Report^(a) from the Officer Commanding 1st Battalion Artillery of the fracture of the rear Foot Boards of four Ammunition Waggon, the wood having given way, at, and below the hooks from which the water Buckets were suspended, about an inch from the bottom of beam, when at Route March on the 2d June 1857, is laid before the Select Committee for their opinion, by order of the Commandant of Artillery.

The Ammunition Waggon is also before the Committee for their inspection of the fractured parts.

OPINION.—The thickness of the Foot Board is obviously insufficient to support the weight of the bucket, as now attached, and the Committee recommend to the consideration of the Superintendent of the Gun Carriage Manufactory the substitution of some stronger mode of attaching it, and that orders be issued for all existing Waggon being altered accordingly without delay.

MEETING 195.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL Æ. SHIRREFF. BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Dépôt Saint Thomas' Mount, 4th September 1857.

PRESENT.

COLONEL P. HAMOND, *Principal Commissary of Ordnance.*COLONEL P. J. BEGBIE, *Commanding 5th Battalion Artillery.*LIEUT. COLONEL J. W. CROGGAN, *Commanding 1st Battalion Artillery.*MAJOR T. LAVIE, *1st Battalion Artillery.*MAJOR G. BRIGGS, *Acting Assistant Adjutant General of Artillery.*MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*MAJOR G. ROWLANDSON, *Director Artillery Depot.*

ARTICLE 757.

ON TRAVERSING PLATFORMS OF THE BOMBAY PATTERN.

With reference to former Proceedings^(a) of the Select Committee, on the Bombay pattern Traversing Platforms, the under-mentioned document on the subject is laid before them under instructions^(b) from the Inspector General of Ordnance and Magazines.

(a) Meeting 193, Article 744, Artillery Records page 547.

(b) Extract from Proceedings No. 1927, 13th July 1857.

Letter^(c) from the Superintendent of the Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines.

(c) No. 483, 9th July 1857.

Sir,—A press of other work has prevented me from giving my attention sooner to the subject of Skeleton Platforms of the Bombay pattern, which it was thought advisable to try here.

2. In obedience to instructions, I made a Platform according to the drawing and dimensions given of it in the 1st

volume of the Proceedings of the Permanent Select Committee of Artillery Officers at Bombay page 137, but it differs a little from the Model subsequently received from thence, and was found altogether unsuited for our Heavy Field Carriages of any calibre for which I conclude it was supposed to be intended.

3. The Model of the Platform being accompanied by one of a Garrison Carriage on Truck Wheels, explains the report of the Bombay Artillery Officers at Pages 122 and 123, 1st Volume, wherein it is distinctly laid down that each Gun is to have a travelling and fighting Carriage similar to our Heavy Field, and a Garrison Carriage similar to the Model on metal Truck wheels with a Skeleton Platform made expressly to suit its dimensions.

4. On reference to these Proceedings it will be observed, the Bombay Officers have tried every kind of Carriage and Platform, and have arrived at the foregoing conclusion as the cheapest and best arrangement that can be made, and my opinion is, we would do wisely to profit by their labors and experience, by adopting the same system unless some officer here is prepared with a better.

5. I have conversed with several members of our Committee on this subject and their opinions seemed to accord with my own. I would therefore suggest that the important subject of Skeleton Platforms may be again brought forward for discussion at our next Meeting, that if possible we may come to some satisfactory conclusion as to the pattern Platform we are to adopt.

OPINION.—The principle adopted by the Bombay Artillery of establishing two carriages for each separate piece, appears to the Committee to involve considerations so serious, on the score of expense and carriage, as to demand the fullest investigation of the grounds of the necessity for such an expedient;—they, therefore, with a view to obtaining fuller information of the views of their Brethren on the Bombay

side, and of the question generally, think it advisable to postpone their opinion until the next Meeting.

ARTICLE 758.

ON METAL FUZES, PROPOSED BY LIEUTENANT H. D. GLOAG
ARTILLERY.—PLATE III.

Submitted for the opinion of the Select Committee by order of the Brigadier Commandant of Artillery.

Specimens of the Fuzes, as also drawings and explanations of the method of making and using them, prepared by Lieutenant Gloag, are laid before the Committee.

Description of the Figures.

Fig. I. Is a section of a Brass Mould for moulding a Fuze as Fig. IV.—Elevation and Section.

Fig. II. Is a section of mould for moulding a Fuze similar to fig. VI.

Fig. III. Shews one half of the mould for forming fig. VI.

Fig. IV. An Elevation and Section of a Fuze.

Fig. V. An Elevation and Section of a Fuze.

Fig. VI. An Elevation and Section of a Fuze.

Fig VII. Plan and Section of a piece of zinc formed in a mould such as seen at fig. IX, and is to be driven into the Fuze hole of the shell, see fig. XI.

Fig. VIII. An iron or steel setter for driving the zinc into the Fuze holes of shells.

Fig. IX. Section of a mould for moulding pieces of zinc of the form seen at Fig. VII.

Fig. X. Section of a mould for making a Fuze like that shewn in Fig. V.

Fig. XI. Shews the method of using the iron setter in driving the zinc bouch into the Fuze-hole of a shell.

Fig. XII. Is for the purpose of sharpening the threads of screw on Fuze, Fig. IV, after it is taken out of the mould.

very
Teeta

drop

Fig. 3

Brass

making



Fig. 10
Mould for Fig. 5



Fig. XIII. Section of S. C. S. with 4ths of Fuze—the whole Fuze being seen in Fig. XV.

Fig. XIV. Section of S. C. S. with 4ths. of Fuze, the whole Fuze being shewn in Fig. XVI.

Fig. XV. Section of a Fuze as Fig. IV, set in a shell.

Fig. XVI. Section of a Fuze as Fig. V, set in a shell.

Fuze fig. IV is moulded in mould fig. I, the threads of screw are all made clear and sharp if necessary; by turning the fuze once or twice in the plate fig. XII, by which means also it may be made to fit the female screw in the fuze hole of the shell very accurately; a notch is to be cut on the head of the fuze so as to admit of its being turned with a screw driver; in fact this fuze is nothing more than a hollow screw nail: it is to be made of Pewter; and only requires driving when taken from the mould; the portion painted red* in the section fig. IV is where some powder and quick match is placed for the purpose of igniting the bursting charge of powder in the shell when the fuze burns out. In fig. XV this fuze fig. IV, is shewn in section set in a shell—*z* is the zinc bouch driven into the fuze hole. *P P* is the priming consisting of paste and quick match, *l* is a leather washer, which is brought in close contact with the outer surface of the shell by the head of the fuze; supposing this shell to be filled with bursting powder &c. the fuze inserted as shewn in fig. XV, it is impossible for fire to reach the powder in the interior of the shell, it cannot pass down between the male and female screws; and the head of the fuze causing the leather washer to sit close to the surface of shell, fire cannot reach the priming *P P*; supposing however that the priming should catch fire it would burn out without firing the charge in the shell:—so the danger of carrying loaded shells in limbers is done away with by fixing a fuze such as is shewn in fig. XV.

Fig XIII shews this fuze set to 4ths of an inch or 2 sc-

* Distinguished in Plate by the word "Red."

conds of time; the method of doing so is as follows—turn the head of the fuze to the left till a sufficient number of threads of the screw on it appear above the outer surface of the shell, then saw off this projecting portion, stir up the priming and the shell is ready for use. The threads of the screw take 10 turns in the space of an inch, so every complete revolution withdraws the fuze $\frac{1}{10}$ of an inch, $\frac{1}{2}$ a revolution $\frac{1}{4}$ &c.—a very good way of ascertaining the proper length to cut off, is to have the back of the saw graduated in tenths of an inch, and then measure how much of the fuze projects; in setting the fuze to 4ths fig. XIII, the fuze is to be screwed out till one inch projects which is to be sawn off, the priming stirred up; and the shell will appear as shewn in the section fig. XIII.

Fig. VI represents a fuze somewhat different from fig. IV, it has three turns of a screw of the same pitch as that on fig. IV immediately below its cap, for the purpose of fastening it in the shell—it is formed in mould fig. II; it has a hollow or groove commencing from the screw along its length on both sides for pieces of quick match; this groove is formed in the mould by a projecting rib, see fig. III, and the graduating is in relief, and is also done when moulding—this fuze is entirely finished in the mould and has only to be driven, and the quick match put in the grooves, when it is ready for use.

Fig. V is the same as fig. VI, except that the cap is not so deep; and the object of lessening the cap is to allow the fuze to be flush with the exterior of the shell see fig. XVI, where a section of fuze fig. V is given fixed in the shell. Fig. XIV, is fuze fig. V cut off to 4ths and inserted in the shell, this fuze being carried in the shell as seen in fig. XVI, it is necessary to screw it out, when required to be adjusted to any distance:—the quick match is to be raised out of the groove as far as the division where the fuze is to be cut off at, after the piece is cut off, the ends of the quick match should be gently twisted across the end of the fuze see fig. XIV,

the fuze is now screwed in and uncapped, when it is ready for use; if a longer or shorter fuze should be required, the one in the shell can be easily and quickly removed and another inserted, as in fuze fig. IV; no fire can pass between the male and female screws; and all that is required to prevent the powder in the shell from being ignited, is a good strong capping over the cup; there is no difference in the mould for moulding fig. V and fig. VI, except in the shape of the iron cores—see fig. II for moulding fig. VI, fig. X for fig. V. The screw on all of these fuzes being of the same pitch, a shell may have any one of them fixed in it.

The zinc bouch ought to be driven into the fuze-hole of the shell $1\frac{1}{2}$ or 2 tenths below the exterior surface, see figs. XIII, XIV, XV, XVI, and it should not have more than three or four turns of female screw in it—as when the female screw is long, the friction of the screw becomes greater and makes it difficult to screw home the fuze fig. IV, unless it is very loose; fig. V, and VI may be constructed of lead, the screw being very short, but pewter would be much better. Fig. XII is a kind of screw plate, by means of which the screw on fuze IV may be sharpened, and made a little smaller, so as accurately to fit the female screw in the bouch which is in the fuze-hole of the shell.

Advantages.

1. No small stores required except a small saw.
2. Saving of time in the field.
3. Fuzes can be set in shells before going into action and adjusted to any distance in a few seconds.
4. Shells may be prepared in every respect for use, have the fuzes inserted and carried in the limbers, without any danger of the bursting powder in them being ignited—especially if fitted with a fuze, like fig. XV.
5. No danger whatever of the shell bursting at the muzzle; the bursting charge can only be fired by the burning out of the fuze.

6. Simplicity in making; after good moulds are constructed any number may be cast by a common workman.

7. No chance of the composition being destroyed or injured by moisture.

8. The composition may be burnt out without injuring the fuzes; which only require to have the residue of the burnt composition removed, when they may be re-driven.

9. All the portions cut off, can be preserved and melted to form other fuzes.

10. The fuze being flush with exterior surface of shell, it cannot in loading hurriedly get jammed in the gun; neither does it offer any resistance to the air during the flight of the shell.

11. Should the shell graze and the part in which the fuze is fixed come in contact with the ground, the fuze cannot be injured, as it might be, when projecting as at present.

Disadvantages.

More expensive than the present fuze.

The objection to carrying the powder in S. C. S. is, that it would be mealed and injured by the motion of the bullets, when the limbers are moving.

Regarding the priming in fuze fig. IV, a good way would be, to make the tube of the fuze a little longer, see *a*, fig. I: and have a small pin passed across a little below the end of the composition, over which some pieces of quick match must be passed, and the remaining space filled up with paste, the end might be secured by a piece of dammered cloth.

Or, merely have a small quantity of gunpowder placed in the end of the fuze, with a little piece of quick match to be put in last, and the end secured with dammer and cloth, the fuze burning out, would ignite the powder, which would blow off the covering, and the quick match dropping into the shell would ignite the bursting charge.

The starting powder, must be put in small narrow bags somewhat like the finger of a glove, sufficiently small to pass

through the hole in the zinc bouch, when they are filled with it; in fuze fig. IV, they ought to be attached with a piece of thread or cement, round the part at *a*, fig. XIII, and, with fuze fig. IV, they can be attached before the battery turns out for practice, and the fuze fixed in the shell as above described. With fuzes V and VI, that require to be cut from the lower end for the purpose of adjusting to distance; the starting bags cannot be attached till the distance is ascertained.

(Signed) HENRY DUNDAS GLOAG,
Lieut. Madras Artillery.
 1857.

The following Table exhibits the result of a trial of two kinds of Fuzes, fired in presence of the Committee.

Date.	Description of Fuze.	Number under trial.	Length of Fuze.		Time of burning.		Remarks.
			ins.	ths.	Sec.	Pts.	
4th September 1857.	Pewter solid head screw Fuze.	1	1	..	5	..	Correct.
		2	..	8	4	..	Correct.
		3	1	..	5	..	Correct.
		4	1	4	6	..	1 second short.
		5	1	4	6	..	1 second short.
		6	..	8	5	..	1 second long.
	Lead Cup Screw Fuze.	1	..	8	4	..	Correct.
		2	..	6	3	..	Correct—did not start.
		3	1	3	6	30	Correct.
		4	1	3	6	30	Correct.
		5	..	8	4	..	Correct—did not start.
		6	..	6	3	..	Correct.

OPINION.—A number of the Fuzes of both kinds, having been set and fired in presence of the Committee with generally very satisfactory results, the Committee recommend that a sufficient number be tried by actual practice, from Howitzers or Guns, and the subject, with the results of the practice, be laid before the Committee at their next meeting.

2. The objects contemplated by Lieutenant Gloag, by the introduction of these Fuzes, propose to meet such im-

portant desiderata in Shell practice from Field Batteries,—the ingenuity and mechanical skill of his contrivances are so interesting, and the success, thus far, so hopeful, the Committee consider every facility and encouragement are due to the full developement of his experiments.

ARTICLE 759.

ON THE SUBSTITUTION OF SHEET IRON FOR WOOD IN THE CONSTRUCTION OF AMMUNITION BOXES OF LIGHT FIELD BATTERIES, SUGGESTED BY LIEUTENANT COLONEL R. C. MOORE C. B.

Submitted for the opinion of the Select Committee by order of the Brigadier Commandant of Artillery.

The undermentioned document is laid before the Committee.

(a) dated 21st August 1857. *Letter^(a) from Lieutenant Colonel R. C. Moore C. B. to the Director of the Artillery Depot.*

Sir,—I have the honor to request that you will have the goodness to lay before the Artillery Select Committee, should the Brigadier Commandant of Artillery deem it advisable, the following suggestion relative to the substitution of sheet iron for wood, in the construction of Ammunition boxes for Light Field Gun and Waggon limbers, and Waggon bodies.

Ammunition boxes constructed of Teak plank, are, with a comparatively slight blow, split or cracked, or if suddenly let fall from a height :—they moreover are ill calculated to protect the Ammunition stowed in them against the fire of the Rifle Muskets recently introduced. I therefore beg leave to suggest, that in the future construction of Ammunition boxes, sheet iron $\frac{3}{8}$ of an inch thick for the sides, and $\frac{1}{4}$ inch thick for the top and bottom be used.

To prevent the probability of an explosion, it would be advisable to line the sides and bottoms of these iron boxes with sheet copper of the thinnest description. A $\frac{3}{4}$ inch plank

secured to the inside of the lid by means of copper rivets, would obviate the necessity for covering that part with sheet copper, and would also admit of the loops for the portfires being nailed thereto. By the substitution of sheet iron as above proposed, for teak plank, I do not apprehend that the weight of the Ammunition Boxes would be objectionably increased, and the following advantages would result therefrom.

They would last much longer than wooden boxes and require fewer repairs.

When shipped for transport by Sea, there would be less risk of their being stove in by a blow, or broken to pieces by a fall from the slings, when being lowered down into the hold.

They would, unless at short distances, resist the penetration of a Rifle shell or ball, especially if struck obliquely, for the missile would glance off.

Whether Ammunition boxes so constructed would cost more than those made up with Teak plank, I am, for want of data, unable to say, but that they would last longer, and could be more fully relied upon in actual service, there can exist but little doubt.

Statement shewing the probable cost and weight of an Iron Ammunition Box, lined with sheet copper, in comparison with a wooden one.

	Materials.		Workmen.		Total.		Weight.
	R.	A. P.	R.	A. P.	R.	A. P.	
1 Wooden Ammunition Box } with Copper Box 9 Pdr. }	13	0 6½	6	6 5½	19	7 0	lbs. 72.
1 Iron Ammunition Box } lined with Copper sheet. }	21	8 6	23	3 0	44	11 6	} lbs. 201½ probable weight.
Copper Box 9 Pdr. (8½ lbs.) included).....	4	1 6	0	6 5	4	7 11	
	25	10 0	23	9 5	49	3 5	

GUN CARRIAGE MANUFACTORY, }
Madras, 31st August 1857. }

(Signed) J. MAITLAND, Major,
Supt. Gun Carriage Manufactory

OPINION.—The excessive additional weight of the proposed iron box, whatever other advantages it might be found to

afford, is wholly incompatible with the capabilities of our Light Field Batteries, and would completely change the whole organization, the Committee, therefore, cannot recommend its adoption.

ARTICLE 760.

ON THE EXPEDIENCY OF INTRODUCING PACK BOXES FOR MULES, FOR THE CONVEYANCE OF FIELD AMMUNITION IN CERTAIN CIRCUMSTANCES, INSTEAD OF AMMUNITION WAGGONS.

Printed copies of correspondence on the subject are laid before the Select Committee under instructions from the Secretary to Government.

MILITARY DEPARTMENT.

No. 2693.

Extract from the Minutes of Consultation, 8th August 1857. Read the following letter, from Colonel P. M. Melvill, Secretary to Government, Military Department Bombay, 28th July 1857, No. 4141; to the Secretary to Government, Fort Saint George.

Sir,—I am directed by the Right Honorable the Governor in Council to transmit, for the information of the Government of Fort Saint George, the accompanying copies of a letter from the Deputy Adjutant General, No. 3746 dated 8th instant, and its enclosed correspondence, relative to the expediency of introducing pack boxes for mules for the conveyance of Field Ammunition in certain circumstances instead of Ammunition Waggons.

From Major J. M. Glasse, Acting Deputy Adjutant General, Bombay 8th July 1857, No. 3746; to the Secretary to Government, Military Department, Bombay.

Sir,—I am directed by the Commander-in-Chief to trans-

1. *Letter from Deputy Adjutant General, No. 1993 of the 16th March 1857, with annexment referred to.*
2. *Ditto No. 12 from Select Committee dated 23rd May 1857.*
3. *Ditto from Deputy Adjutant General No. 3331, of the 29th May 1857.*
4. *Ditto No. 235 from Commandant of Artillery, dated 15th June 1857.*
5. *Ditto No. 20 from Select Committee, of the 6th July 1857.*

mit to you, for submission to the Right Honorable the Governor in Council, the accompanying correspondence as noted in the margin, and to convey the expression of His Excellency's concurrence in the views of the Select Committee of Artillery Officers, as therein set forth.

P. S.—As all the originals in this correspondence could not be forwarded, copies of the whole for the sake of compactness are submitted.

From Major J. M. Glasse, Acting Deputy Adjutant General, Bombay, 16th March 1857, No. 1993; to the Permanent Select Committee of Artillery Officers, Bombay.

Gentlemen,—In forwarding for your information the annexed Extract from a letter from Lieutenant General Sir J. Outram K. C. B. I am instructed by the Commander-in-Chief to request that you will immediately take the subject into consideration, and prepare for submission to His Excellency, and Government, a pair of muster Ammunition Boxes with Straps, and fastenings, to meet the requirements therein detailed.

Extract from a letter from Lieutenant General Sir James Outram K. C. B. to the Adjutant General of the Army, No. 6, dated Camp near Bushire, 25th February 1857.

9. "I propose, therefore, so soon as they can be procured, substituting eight pack mules for each of the six extra waggons, and thus effect a saving of 54 Horses and sets of Harness per troop, and Battery.

10. "The Field Commissary of Ordnance is of opinion that he could make up the mule saddles, and a portion of the

boxes here, similar to those used by the Persians which were taken in the affair of the 8th Instant, and to enable Captain Finnimore to carry this out, it would be necessary that 4000 yards of "double Gunny Paut," and a proportionate quantity of twines and needles be despatched from Bombay with as little delay as possible.

11. "The Boxes for immediate use can also be made up here, but it would be desirable that the Gun Carriage Department be directed to prepare boxes, (two of which with their contents would not exceed 180 lbs. in weight) to be fastened together by leather straps passing over the mule's back, the straps passing round the boxes clear of the lid which would open in the centre of the top clear of the straps, so that the ammunition might be got out without it being necessary to remove the box from the mule's back."

From the Permanent Select Committee of Artillery Officers, Bombay, 23rd May 1857, No. 12; to the Adjutant General of the Army, Mahableshwar.

Sir,—The subject of your Letter No. 1993, of the 16th March, has had our best attention.

1. A pair of Pack Boxes for the carriage of ammunition, of the dimensions and description required by Lieutenant General Sir James Outram, in the Extract of his letter accompanying the above communication, were made up by the Agent for Gun Carriages and on being packed with ammunition to the extent permitted viz. 180 lbs., we find that for this limited weight, the Boxes in question, were far too large, the shot, shell, and cartridges, yielding the given weight, not half filling the Box.

2. It therefore became necessary to adopt a box which, whilst it met all necessary requirements, should be more proportionate in dimension to the required contents.

3. Four Boxes, answering all these requirements have therefore been prepared, one for each calibre of field ammu-

munition, and their interior dimensions and contents, are as follows.

Dimensions of Box.....Length 20 inches.

Breadth 11 do.

Depth 9 do.

Contents of each Box.....Total weight lbs.

For 24 Pounder Howitzers 3 Rounds of shot and

shell with Cartridges Fuzes &c..... 89½ lbs.

12 „ „ „ „ 5 „ „ „ 83¼ „

9 „ Gun „ „ 6 „ „ „ 92½ „

6 „ „ „ „ 8 „ „ „ 86 „

Being as near an approximation to the given weight as can well be accomplished, and as the aggregate quantity of ammunition for each calibre, will, by substituting 8 Pack Mules for each extra waggon, and Limber, exceed considerably the proportion established, for an extra waggon the above weight may be reduced at pleasure.

For instance.

Rounds of
shot and shell.

A 24 Pdr. Howitzer waggon with Limber, holds 46

16 Pack Boxes with 3 Rounds each hold..... 48 do.

Excess... 2

A 12 Pdr. Howitzer waggon with Limber holds... 58 do.

16 Pack Boxes with 5 Rounds each..... 80 do.

Excess... 22

A 9 Pounder waggon with Limber holds..... 72 do.

16 Pack Boxes with 6 Rounds each..... 96 do.

Excess... 24

A 6 Pounder waggon with Limber holds..... 96 do.

16 Pack Boxes at 8 Rounds each.....128

Excess... 32

Drawings of these Boxes with mode of Packing and detailed lists of the contents of each are hereto appended for His Excellency the Commander-in-Chief's information—no implements are included, these being already at hand in the

Gun Limbers—The Boxes ready packed are deposited in the Grand Arsenal.

From Major J. M. Glasse, Acting Deputy Adjutant General; 29th May 1857, No. 3331; to the Commandant of Artillery, Bombay.

Sir,—I am directed by the Commander-in-Chief to transmit to you (to be returned) the accompanying letter, No. 12, dated the 23rd instant, from the Permanent Select Committee of Artillery Officers, with previous correspondence upon the same subject, and to request that you will be good enough to state if you have any further opinion to offer on the general question submitted.

2. I am at the same time to observe that His Excellency considers it would be inexpedient to adopt both boxes for mule carriage, and spare waggons for the conveyance of spare Gun Ammunition.

3. Perhaps a certain number of boxes might be made up and kept in store, for issue when the nature of the country in which operations are carried on, rendered the movements of waggons difficult—or perhaps the Pack Boxes might on all occasions of service be substituted for the spare waggons—your sentiments on the subject are requested.

From Colonel A. Rowland, Commandant of Artillery, 15th June 1857, No. 235; to the Deputy Adjutant General of the Army, Bombay.

Sir,—I have the honor to acknowledge the receipt of your letter No. 3331, of 1857, transmitting No. 12, from the Permanent Select Committee, and correspondence on the substitution of eight Pack Mules for each of the second Waggon of the Batteries in Persia, and to state that as far as the pattern of Box best adapted for Pack Mules, I have nothing to add to the opinion of the Committee.

2. The second paragraph conveys the opinion of His Excellency the Commander-in-Chief, that it would be inexpedient to adopt both Boxes for Mule carriage, and 2nd Wag-

gons for the extra ammunition, taken by Batteries on Field Service.

3. Paragraph three contains two suggestions, one that a certain number of Boxes be kept in store for issue on special occasions, the second the substitution of Pack Boxes for second Waggon on all occasions; against the second suggestion I beg to submit that preference has been given to the Waggon for the conveyance of ammunition for Battery, and reserve throughout Europe, as well as India, and the soundness of the preference seems confirmed by their still continuing in use after so many years. The being able always to have one Waggon to keep up with the Gun, and assist the men should the pace be such as would distress them—the safety of the ammunition against weather and damp ground—the compactness of line of march—the smaller number of men and cattle—and being able to replace disabled horses with the Gun—are all manifest advantages in the Waggon, and nothing transpired in Persia to lessen their value; the fault there, was not being able to procure draft cattle as expected.

4. Keeping a store of Boxes fit for Pack service with Guns might be adopted if it could be effected with some little economy; that is if the Boxes could be made available for spare ammunition in the charge of the Commissary of Ordnance—and carried on Carts—Camels—or Bullocks—and by removing the partitions be made useful for other purposes—but a proportion of Boxes with Pack Saddles complete, being added to the equipment of a Field Battery, is perhaps such a change as requires to be submitted to the Select Committees of Bombay, Madras, and Bengal, and Government.

5. The accompaniments to your letter are herewith returned.

From the Permanent Select Committee of Artillery Officers Bombay, 6th July 1857, No. 20; to the Adjutant General of the Army.

Sir,—The subject of your letter No. 3495, of the 16th

ultimo, with accompaniments, has had our attentive consideration.

We quite agree with the Commandant of Artillery in deprecating under any circumstances, the abolition of the extra Waggons with Field Batteries.—These waggons it is, for obvious reasons, most essential to retain in complete efficiency in readiness for any service, and should at any time the nature of the country in which hostile operations are undertaken, render it desirable to have recourse to pack cattle for the conveyance of the Field Ammunition, the Boxes recommended by us in our report No. 12 of 1857, are of such simple construction and materials, that the necessary supply of them could be readily made up by ordinary workmen, in so short a space of time as to render it unnecessary and inexpedient to lumber our Magazines, in time of peace, with a supply of these Articles.

The Pattern of Pack Box established by authority should be deposited in the Grand Arsenal as a guide to Commissaries in their construction, when occasion may arise.

The accompaniments to your letter are herewith returned.

OPINION.—The Committee concur in the views of their Bombay Brother Artillerymen in deprecating the idea of interfering with the extra Waggons, which they consider essential to the efficiency of our organization, but the facility suggested for adopting Pack Cattle carriage on emergency in providing a supply of pack boxes, they consider very desirable.

ARTICLE 761.

ON THE BEST DESCRIPTION OF BULLET FOR THE BRUNSWICK RIFLE.

(a) No. 4541, 27th August 1857.

(b) dated 26th Aug. 1857.

The Adjutant General of the Army submits^(a) for the opinion of the Select Committee, a letter^(b) from Major G. de Sausmarez, suggesting the advantage of substituting a Bullet on

the expanding principle for the Belted Ball now in use with the Brunswick Rifle.

Letter from Major G. de Sausmarez to the Adjutant General of the Army dated 26th August 1857.

Sir,—Having learnt the probability of the employment of the Rifle Companies of the Madras Army on active Service, I would beg to submit for the consideration of His Excellency the Commander in Chief, the advantage of substituting a Bullet on the expanding principle for the Belted Ball now in use with the Brunswick Rifle.

2. Avoiding all technical detail, the advantage to be derived from the proposed alteration may be briefly stated as follows.

- I. Greatly increased facility and rapidity of loading.
- II. Great increase of range and of power of penetration.
- III. Greater accuracy of fire.

3. With a view to avoid windage and consequent loss of power and other defects, the Belted Ball now in use has been made to fit the Rifle Barrel so tightly that it will only allow of its being rammed home with a patch, when the weapon is moderately clean; when the barrel becomes thoroughly foul from firing, it is found almost impossible to load, and it is stated that in one of the Actions of the Punjaub, the Brunswick Rifle became thus almost useless for the time. Even when the Rifle is clean, a certain amount of delay takes place in loading, from the necessity of fixing the patch and adjusting the belt of the ball to the groove of the Rifle.

4. With an expanding bullet, all difficulty of loading is removed, it may be made loose and smooth, so as almost to be dropped into the Barrel: On the explosion of the powder, the base of the bullet is dilated, so as not only to do away with windage, but its sides are moulded into the groove of the barrel, so as to obviate all necessity for flange or Belt and its consequent adjustment when loading.

5. Windage being virtually done away with, by the expansion of the bullet, all escape of gas on the explosion of the powder, and consequent loss of power is obviated, the bullet is projected with greater force, and a greater range with more horizontality of fire is attained, whilst the inaccuracy which would otherwise occur from the looseness of the Bullet, and its consequent zig zag motion in travelling through the barrel is at the same time avoided.

6.* By the printed Returns of the Ball Practice of the Army from 1815 to 50, I observe the greatest distance at which the Rifle Companies practised was 300 paces, or 260 yards, and 40 yards beyond this range is the generally accepted limit for accuracy of fire of the Brunswick Rifle with the Belted Ball, but with elongated bullets on the expanding principle, I have found the Rifle both effective and accurate up to 500 and 700 yards.

7. Having no means or establishment of any kind at my command, I have been utterly unable to carry on any scientific experiments, and have been able to arrive only at very general conclusions, but I have for some time past been trying the Brunswick Rifle with two descriptions of elongated expanding bullets, one furnished to me from the Grand Arsenal invented by Mr. Gubbins of the Bengal Civil Service, and a second a modification of that cast for Jacob's Rifle, hollowed conically at the base, which I received from Major Rowlandson, Director of the Artillery Depot where it was made.

8. Up to 500 yards, I used only $2\frac{1}{4}$ drams of sporting powder as a charge for these bullets, with about the same accuracy of fire, it appeared to me that Mr. Gubbins' bullet required a little less elevation than that of Major Rowlandson's, but the latter being 10 grains heavier, may perhaps account for the difference. Mr. Gubbins states his bullet to make good practice at 1000 yards, and Major Rowlandson has I believe tested his at still more considerable distances, with generally satisfactory results.

9. I am informed that Major Haley of the Malabar Rangers has been trying a bullet of the Enfield pattern, but with the Pritchett hollow as first used at Hythe with considerable success, but never having seen either the Bullet or Return of firing, I am unable to express any decided opinion, but I should be inclined to think that a bullet of that form for so large a bore as that of the Brunswick Rifle, would be so heavy as greatly to increase the recoil, and on that account render its use undesirable.

10. Since the discovery of the expanding principle in Bullets, so many various forms of elongated projectiles have been proposed; every leading Gun-maker advocating his own, it is difficult to determine which is the best, but I believe either of the bullets I have been trying might be adopted with the most decided advantage to the service in supercession of the Belted Ball.

11. In Mr. Gubbins' bullet there is a Cannelure near the base, which allows of a patch being tied on without the thread projecting beyond the side of the bullet, this is most useful, there is no reason however why it should not be added to that of Major Rowlandson's and the loading of the Rifle with either bullet, would thus take place with almost the same rapidity as that of the Common Musket.

12. The severe recoil of the Brunswick Rifle is one of the chief objections to its use, and it is right I should mention, that whilst the weight of the Ammunition will be considerably increased, the recoil also will be greater, though not in a corresponding degree, for from its expansive property, and its improved form, giving more direct action to the powder, a less charge is required, and I would submit, that the advantages gained will far outbalance the inconvenience now referred to.

13. As the Bullet is expanded by the direct action of the powder, without intervention of plug or Minie Cup, no expense would be entailed upon the Government, except the tri-

fling cost of moulds, which can be made without difficulty in the Arsenal.

14. By taking the sight rather full in aiming, the necessary increased elevation for 4 or 500 yards might be gained with the present sights, but to give full effect to the proposed improvement, I would beg to recommend, should there be sufficient time to do so, that a new sight be attached to the Rifle, and that if procurable, superior powder to that now used with the common Musket, and of finer grain, be issued to Rifle-men.

15. I would further beg to suggest that, Position, Aiming, and Judging Distance drills, as laid down in the Hythe Instruction Book be commenced with as soon as possible in any of the Companies which may not be required to move immediately,

(c) No. 4578, 29th August 1857. *Letter^(c) from the Adjutant General of the Army to the Brigadier Commandant of Artillery.*—Forwards Extracts of a letter from Major Hodson 16th Regiment N. I., together with 2 conical balls, to be included in the report by the Artillery Select Committee already called for.

Extracts of a letter from Major Hodson 16th Regiment N. I.

“ The Company now use loose belted Ball, Cartridge, and greased Patch, these from being separate cause delay in loading, and from the ball being made to fit too tight, it was found impossible to use them when the Company was in the Field in 1845, and the ordinary musket Cartridges were served out.”

“ Major Carr has lately been making experiments and made moulds from which the Conical Balls I send by Banghy are cast.

*	*	*	*
*	*	*	*
*	*	*	*

“ At 400 yards the Rifle with sight down, threw them 400 yards point blank, in fact threw them as far with the sight down as the belted Ball with sight up.”

(d) No. 1628, 2d September 1857.

1. *Letter^d from the Adjutant General of the Army to the Brigadier Commandant of Artillery.*

Sir,—I have the honor, by order of the Commander-in-Chief, to request that the Artillery Select Committee may be instructed to report, whether the Common Musket Ball can be used with proper effect with the ordinary two grooved Brunswick Rifle.

After much firing it has been found difficult to load the above weapon with the belted Ball and patch, and the Commander-in-Chief adverting to the prospect of the Madras Rifles being shortly employed on active service is anxious to learn whether the common Ball cartridge may not be substituted with advantage for the Belted Ball and patch.

As early a report as possible is requested on this subject; and Lieutenant General Sir P. Grant considers that one or two mornings may be sufficient for the experiments requiring to be made on the point now referred.

OPINION.—The Committee, from the ample results of extended and varied experiments before them (conducted severally by Major Italy, Commanding Malabar Police Corps, with the Minie Bullet;—by their Secretary, during several months past, and by Mr. Gubbins of the Bengal Civil Service), have no doubt whatever that the elongated bullet, of certain forms, with $2\frac{1}{2}$ drams of good Powder; places the Brunswick on a par, nearly, with the Enfield:—but to give effect to this, sights of the Enfield form are requisite, and the men must be carefully instructed;—moulds would have to be made, and ammunition prepared; all which is, for the present impending service of the Rifle Regiment, out of the question;—they therefore do not recommend its *present* adoption.

2. The result of Experiments conducted by their Secretary during two mornings, establishes the uselessness of the Belted Bullets after a few rounds, from the difficulty, often, impossibility of ramming them home, and the efficiency of

the practice of the Brunswick Rifle fired with common service musket cartridges of $4\frac{1}{2}$ drams and spherical bullet, from 400 to 450 yards with the sight up, and from 200 to 250 point blank, or with the sight down.

3. It must be remarked, that using the Rifle with the spherical ball, reduces the Rifle in principle to the condition of a common smooth bored musket, and to reduce the charge of $4\frac{1}{2}$ drams, would therefore be to destroy its efficiency,—the value of the Rifle charge of $2\frac{1}{2}$ drams being due entirely to the Rifle principle, and annihilation of windage.

4. The windage with the Brunswick Rifle with the Musket ball, being less than with the Percussion musket, gives the former somewhat better range.

ARTICLE 762.

ON THREE UNSERVICEABLE BEAMS OF 6 PDR. CARRIAGES IN USE WITH THE B. TROOP HORSE ARTILLERY AT TRICHINOPOLY WHICH HAD FAILED.

(a) Meeting 194, Article 752.

The Beams having been inspected by the Committee at the last Meeting^(a), they recommended their being cut up into sections and subjected to Barlow's test, and the specific gravity of the wood ascertained.

The undermentioned documents are laid before the Committee.

(b) No. 612, 2d September 1857.

Letter^(b) from the Superintendent of the Gun Carriage Manufactory to the Director of the Artillery Depot—forwarding Extracts Nos. 1 and 2

(c) Nos. 4, 5 and 7 of 1851.

(d) No. 3.

from the Breakage Report of the timber of which the above Carriages^(c) were made, also forwards for comparison, a Report^(d) on the Elasticity and strength of the same Timber calculated according to the formulæ given in Major Simpson's Memo: for the Brigadier Commandant of Artillery dated 17th April 1856, and which is the form now in use, and two papers^(e) shewing the mode of calculating the Elasticity and Strength of Timber.

(e) Nos. 4 and 5.

Date.	30 lbs.	Average weight broke with.	Remarks.
1857 May	702 702 926	776 $\frac{2}{3}$	Boke immediately after the 12th weight. do. 1 minute " 12th " do. 1 " " 16th "
	926 150 038	1038	do. immediately " 16th " do. " " 20th " do. " " 18th "
	926 926 926	926	do. 1 minute " 16th " do. 4 " " 16th " do. 2 " " 16th "

timber very dry,
er poorly. The
wn-streaks, grain
between the grain.— (Signed) J. MAITLAND, Major,
Madras, 7 Supt. Gun Carr. Manjy.

*in the Month of October 1850 in part of an Indent dated
d's letter No. 5395 dated 9th October 1850.*

Distance of specimen from centre of Log.		Vide Register of Timber page.	Remarks.			
Ins.						
4	}	265	Broke immediately after the 12th weight.			
6			do.	1 minute	"	12th "
8			do.	1 "	"	16th "
3	}	265	do. immediately " 16th "			
5			do.	"	"	20th "
7			do.	"	"	18th "
3	}	265	do. 1 minute " 16th "			
5			do.	4 "	"	16th "
7			do.	2 "	"	16th "

open and the timber very dry,
it broke rather poorly. The
ish and brown streaks, grain
matter between the grain.—

(Signed) J. MAITLAND, Major,
Supt. Gun Carr. Manfy.

*Month of October 1850, in part of an Indent dated
17th April 1856.*

W d ²	Distance of specimen from centre of Log.	Vide Register of Timber page.	Remarks.			
	Ins.					
6	4	} 265	Broke immediately after the 12th weight.			
6	6		do. 1 minute	"	12th	"
5	8		do. 1 "	"	16th	"
5	3	} 265	do. immediately	"	16th	"
5	5		do. "	"	20th	"
0	7		do. "	"	18th	"
05	3	} 265	do. 1 minute	"	16th	"
05	5		do. 4 "	"	16th	"
05	7		do. 2 "	"	16th	"

and the timber very dry,
broke rather poorly. The
and brown streaks, grain
between the grain—

(Signed) J. MAITLAND, Major,
Supt. Gun Carr. Manfy.

No. 5.

*to the Formula given in Major Simpson's Memo. .
7th April 1856 forwarded by the late Military Board
30 dated 5th July 1856.*

EXPERIMENT.

Experimental pieces are 3 feet in length and $1\frac{1}{2}$ Inch

t of the scales &c. 30 lbs.

sustained after every successive 5 minutes with the
the scales included, and deflection of Piece No. 1.

Weight.	Deflection.	
478 lbs.	1st	·9 inch.
590 lbs.	2d	1·3 „
702 lbs.	3d	1·8 „
<hr/> 1770	3)	4·0
<hr/> 590	Average	<hr/> 1·3333

ation of Column $E = \frac{L^3 W}{32 b \cdot d^3 \cdot \delta}$ in the Breakage Re-
with enclosed.
for Elasticity.

Length of piece of wood.

Weight suspended for breaking the piece of wood.

Breadth of the piece of wood.

Depth. „ „

Deflection. „ „

ity (E) is equal to the cube of the length (L) in
plied by the breakage weight (W), and the product
y the cube of the depth (d), multiplied by 32 times
th (b) and deflection (δ).

$$E = \frac{L^3 W}{32 b \cdot d^3 \cdot \delta} = \frac{3^3 \times 590}{32 \times 1\frac{1}{2} \times (1\frac{1}{2})^3 \times 1\cdot3333} = 73.$$

Explanation of column $S = \frac{LW}{4 b \cdot d^2}$ in the Breakage Report.

S the strength of the piece.

L Length of the piece 3 feet long.

W Weight with which the piece broke 702 lbs.

b Breadth of the piece $1\frac{1}{2}$ inch.

d Depth do. $1\frac{1}{2}$ „

$$S = \frac{LW}{4 b \cdot d^2} = \frac{3 \times 702}{4 \times 1\frac{1}{2} \times (1\frac{1}{2})^2} = 156.$$

GUN CARR. MANFY. } (Signed) J. MAITLAND, Major,
Madras 2d Sept. 1857. } Supt. Gun Carr. Manfy.

OPINION.—The results of the test to which the Beams under report were subjected in presence of the Committee,^(f)

^(f) Vide accompanying Report. are unfavourable, showing the wood to be too dry and defective, and unfit for Gun

Carriages.

2. These Beams belonged to a set of six Carriages proved in January 1855, two of which broke short off under proof, and the remaining four having since gone (three of them being those above shewn) it would appear that the defective condition of the wood cannot be imputed to the subsequent lapse of $2\frac{1}{2}$ years.—The specific gravity when cut out of log was $52\frac{1}{4}$ lbs, now only 40 lbs, 38 lbs, 36 lbs, severally, per cubic foot, a falling off, which seems also to indicate defect.

Report on the strength of the undermentioned Timber cut out of three unserviceable beams of 6 pdr. Carriages, lately in use with the B. Troop Horse Artillery at Trichinopoly, which failed in January 1856, and recommended to be cut up and subjected to Barlow's Test, and the Specific Gravity ascertained, by the Permanent Artillery Select Committee in Meeting 194, Article 752.

Date.	No. of Specimen.	Nature of Wood.			Length.			Weight.			Specific Gravity.			Deflections with.				REMARKS.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
		Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.	lbs.	Ins.

Nos. 1 of 4 and 5 Beams, broke with longer splinters than the rest, but the surfaces of the fractures exhibit a dry loose powder lying between the fibres, indicating a degree of defect and dryness incompatible with unexceptionable Teak: all the others broke short, without splintering as sound tough wood usually does, with the same appearance of dry powder on its surface, and of inferiority.

A piece of Teak of the above dimensions, weight 2 lbs. cut out of the traversing handspike of a Heavy Field Carriage made in 1825, was tested on the following day, and gave the following results.

Greatest deflection 1 inch 4 tenths.

Broke 1 minute 40 seconds after the 16th weight.

Broke with 926 lbs. including scale.

ARTILLERY DEPOT ST. THOMAS' MOUNT }
4th September 1857.

(Signed) G. ROWLANDSON, Major,
Secretary Permanent Artillery Select Committee.

ARTICLE 763.

ON A SUGGESTION BY MAJOR G. ROWLANDSON FOR ALTERING THE HANDLES OF AMMUNITION BOXES, TO ALLOW OF CARRYING OFF DISABLED CARRIAGES. .

The above suggestion is submitted for the opinion of the Select Committee by order of the Brigadier Commandant of Artillery, in continuation of Meeting 192*
* Artillery Records Page 520. Article 733.

OPINION.—Experiments having failed to discover any feasible method of carrying off the carriages, without disturbing the inner handles of the limber boxes, the Committee recommend the alterations of the handles to the special Board pattern as decided on (conditionally) in their previous Meeting No. 192.

2. In the Royal Artillery Boxes, the inner handles seem omitted altogether, but for purposes of carrying, the two handles are preferable.

3. The Committee recommend that a drawing be furnished by the Superintendent of the Gun Carriage Manufactory to out Station Arsenals, to guide them in altering the handles of Limbers in use and in Store at the several stations.

ARTICLE 764.

ON UNIFORMITY IN THE CONSTRUCTION OF GARRISON CARRIAGES AND PLATFORMS.

With advertence to the recommendation of the Select Committee on the above subject at their last Meeting,^(a) the undermentioned documents are laid before them.

(a) Meeting 194 Article 746 Art. Records Page 553.

(b) No. 611 2d September 1857.

Letter^(b) from the Superintendent of the Gun Carriage Manufactory to the Director of the Artillery Depot.—Forwarding drawings of two Plat-

forms for 3 Heavy and 3 Light Calibres as in use at Woolwich, and states, that the suggestion of the Inspector General of Ordnance, of having only one platform for all calibres can be accomplished, by adopting the Platforms for Light Calibres for all pieces, and constructing the sliding beds of all Garrison Carriages for these Platforms of one size, so that they may slide between the cheeks of the Platform ; and to meet the greater distance between the shoulders of the large and small calibres, it will only be necessary to increase the breadth of the recoiling plates on the upper surface of the Platform cheeks.

Is in doubt as to whether each calibre should have a separate carriage, suggests a reference to Woolwich on this point.

OPINION.—It appears to the Committee from the explanation afforded in the Superintendent's letter, that no difficulty exists in giving effect to the proposal for one Dwarf Traversing Platform for all carriages;—recommend that one be made for trial.

2. With regard to the uniformity of pattern of Carriages, they prefer waiting for further information before they record their opinion thereon.

MEETING 196.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL A. SHIRREFF, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot Saint Thomas' Mount, 21st December 1857.

PRESENT.

COLONEL P. HAMOND, *Principal Commissary of Ordnance.*

LIEUT. COLONEL J. W. CROGGAN, *Commanding 1st Battalion Artillery.*

MAJOR G. W. Y. SIMPSON, *Superintendent Gun Powder Manufactory.*

MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*

MAJOR G. ROWLANDSON, *Director Artillery Depot, and Secretary.*

MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*

CAPTAIN H. T. MOLESWORTH, *2nd Battalion Artillery.*

ARTICLE 765.

ON STRENGTHENING THE CHEEK-BOLTS OF LIGHT FIELD CARRIAGES

The Inspector General of Ordnance and Magazines requests^(a) that the suggestion of the Brigadier Commandant of Artillery^(b) that the Cheek Bolts of Light Field Carriages should have more substance to withstand the shock in firing, may be submitted to the Artillery Select Committee for their decision.

Extract from letter^(b) from the Brigadier Commandant of Artillery to the Inspector General of Ordnance and Magazines.

2. " A similar injury to the side bolts from firing, was " discovered to have occurred in the cases of the Howitzer " Carriage reported on in letter to the Secretary Military " Board No. 224 of 5th June 1855, and hence it appears " these bolts require more substance to withstand uninjured " the shock in firing :—I therefore would propose in accor-

* G. O. G. 27th January 1824. "dance with the Orders of Government,*
" that this suggestion be submitted to the
" Artillery Select Committee at their next Meeting.

Letter^(c) from the Superintendent of the Gun Carriage Manufactory to the Director of the Artillery Depot. States, that strengthening the Side and Eye-bolts of our Light Field Carriages will assimilate us to the Bengal Presidency, and that the increase in weight from the bolts being made one inch instead of $\frac{7}{8}$ inch will be about eight pounds.

OPINION.—The Committee concur in the opinion of the Superintendent of the Gun Carriage Manufactory, that the Cheek-bolts of the Light Field Carriages require additional strength, and recommend the suggested increase of their thickness.

ARTICLE 763.

PROPOSED METHOD OF BOUCHING ORDNANCE.

The Inspector General of Ordnance and Magazines forwards^(a) a proposition from Mr. Patterson, Overseer of the Arsenal of Fort Saint George, on the bouching of Ordnance, for submission to the Artillery Select Committee.

(a) Extract from Proceedings No. 5628, 30th Oct. 1837.

Proposition relating to the Bouching of Ordnance.

It has frequently occurred in rebouching Ordnance, that the bouch has been extracted with difficulty, owing to a difference existing between the pitch of the external and internal screw, the thread of which, has been in some measure stripped by the force necessary to place it fairly in position.

The inequality may have arisen from bungling workmanship, or from inferiority of the screwing apparatus, hence it becomes a question of importance, that some definite rule should be followed, and a uniform thread of screw adopted in bouching all ordnance, not merely to simplify the operation, but to preserve the guns from being enlarged at the

bouch, the thread of which in all cases referred to above, had to be cleared away before a new screw could be cut in the metal.

A 6 pounder gun, - No. $\frac{704}{1618}$ recently sent to the forge has been thus treated, and the evil will increase in all subsequent operations, unless an uniform system is established, and all Arsenals supplied with similar screwing apparatus.

It is the practice amongst all the leading Manufacturers of machinery, and the Home Government have followed the example, to form their screws on a fixed rule, and the pitch on some multiple of a standard. Whitworth has adopted eighths in preference to the decimal notation, as lessening the introduction of new values on the existing screws of machinery, and has patented a screwing apparatus, which is rapidly finding its way into every workshop.

Bouching new guns.

As screws are really cut, and not raised by force and pressure by his dies, it is recommended that his system be followed, and that all future bouches should be cut to eight threads to the inch.—A die and muster tap with the ordinary working taps being supplied to all Arsenals; the muster tap to be rigidly preserved, to form new dies as the old ones become worn or unserviceable.

The Grand Arsenal should be in possession of this valuable apparatus complete, and of the two sizes for large, and small works.

It may be considered that too much stress has been laid on such a simple matter as a screw, but its importance has long been recognized by the most able men of England—the very subject of this Memo. (difficulty in adapting a screw to its nut) having given rise to the change in the system, which as before stated, is now uniform in all large Machine Manufactories.

ARSENAL,
FORT ST. GEORGE, }
28th October 1857. }

(Signed) P. HAMOND, Col..
Print. Comy. of Ordn.

OPINION.—The subject to be brought forward again at the next Meeting, in order to fuller information being obtained.

ARTICLE 767.

ON THE SUBSTITUTION OF AN IRON FOR A WOODEN SEMELLE FOR 18 PDR. HEAVY FIELD CARRIAGES.

The Inspector General of Ordnance and Magazines forwards^(a) copy of a letter^(b) from the Superintendent of the Gun Carriage Manufactory, proposing as a remedy for the defect brought to notice by the Commandant of Artillery,^(c) in Heavy Field 18 Pdr. Carriages, (viz. that owing to the altered position of the trunnions in the latest received Ordnance, the thickness of the wooden semelle prevents the gun resting fair in the travelling trunnion holes :—the position of centre of trunnions in the new 18 pdrs. being 1·2 inch below the axis of the piece, whilst in the old pattern it is 2·76 inches, a difference of 1·56 inch), the substitution of iron semelles, and requests the subject may be submitted for the opinion of the Select Committee.

OPINION.—The Committee see no objection to the iron semelle, which appears to answer perfectly, while it remedies the defect arising from the thickness of the wooden semelle, and therefore recommend its being substituted.

ARTICLE 768.

ON A BOLT WITH A SCREW-NUT, PROPOSED BY MAJOR J. E. MAWDSLEY TO BE USED TO FASTEN ON THE SWIVELS ON THE END OF THE POLES OF LIGHT FIELD LIMBERS.

Submitted for the opinion of the Select Committee by order of the Commandant of Artillery.

The following Extract of a letter from Major J. E. Mawds-

Key to the Director of the Artillery Depôt, is laid before the Committee, with a model of the bolt and screw nut.

"I now write to say I have despatched by this day's post
 " (Bhangy) a bolt with screw nut, which I have long had in
 " use on the end of all Poles of Limbers to fasten on the
 " swivel:—the difference between mine and the established
 " pattern, merely consists in the screw nut. I used to have
 " my pins at the end of the pole constantly coming out in
 " consequence of the key at the end of the bolt, being
 " broken by the hooks on the hames, and the chain at the end
 " of the traces rubbing against it;—I have frequently lost
 " the bolts at Exercise, and it was this that made me think
 " of the screw.—Now if the pin be lost, the nut will not
 " come off."

OPINION.—The Committee recommend that the alteration be more fully experimented and reported on by other Troops, before a change affecting the simplicity of the equipments be decided on.

ARTICLE 769.

ON METAL FUZES, PROPOSED BY LIEUTENANT H. D. GLOAG,
 IN CONTINUATION OF MEETING 195, ARTI-
* Page 586 Artillery Re-
 cords. CLE 758 OF 4TH SEPT. 1857.*

Experiments with these fuzes having been carried on in firing shells fitted with them from a 24 Pdr. Howitzer, the results are laid before the Committee.

OPINION.—The Committee regret that the more extended experiments with these fuzes have not fulfilled the hopes entertained of them, and therefore cannot recommend their adoption.

Table exhibiting the result of Experiments made with Metal Fuzes, proposed by Lieutenant H. D. Gloag, and recommended by the Permanent Artillery Select Committee in Meeting 195, Article 758, under date 4th Sept. 1857.

Date.	Ordnance.	No. of Rounds.	Charge.	Description of Fuze.		Elevation.		Length the fuze was cut at.		Time at which the fuze		Distance at which the fuze		Remarks.
				Pewter Solid head	Lead cup screw	D.	M.	Ins.	ths.	Should start.	Sec.	Should start.	yds.	
19th November 1857.	24 Pdr. Brass Howitzer.	10	2 lbs.	1	1	1	45	4	2	Did not start.	Do.	Did not start.	700	Three leaden cup fuzes carefully measured and cut, burnt as below noted. 1 1 inch 0 ths. burnt 5½ seconds. 2 1 " 0 " " 5½ " 3 1 " 4 " " 9½ " It was observed that in fuzes burnt the whole length, the metal melted and opened, a result of itself fatal to their utility.
		9		1	1	1	45	4	2	Do.	3½	700	Do.	
		8		1	1	1	5	4	2	3½	800	700	800	
		7		1	1	1	5	6	3	4	950	900	850	
		6		1	1	1	5	6	3	3	900	900	950	
		5		1	1	1	5	6	3	4	800	1000	800	
		4		1	1	1	5	8	4	Did not start.	6	Did not start.	1400	
		3		1	1	1	5	9	4	Did not start.	Do.	Did not start.	1200	
		2		1	1	1	5	9	4	Do.	2	Do.	500	
		1		1	1	1	5	3	11	1½	1	600	350	
		14		1	1	3	3	3	11	Do.	Do.	Did not start.	800	
		13		1	1	3	3	5	21	Do.	Do.	Did not start.	Do.	
		12		1	1	5	5	6	3	Did not start.	Do.	Did not start.	900	
		11		1	1	5	5	6	3	Do.	Do.	Did not start.	900	
19th November 1857.	24 Pdr. Brass Howitzer.	10	2 lbs.	1	1	10	10	8	4	Started at muzzle.	3½	Started at muzzle.	850	It was observed that in fuzes burnt the whole length, the metal melted and opened, a result of itself fatal to their utility.
		9		1	1	10	10	6	3	Did not start.	Do.	Did not start.	1000	
		8		1	1	10	10	8	4	Do.	Do.	Did not start.	1000	
		7		1	1	10	10	8	4	Do.	Do.	Did not start.	1000	
		6		1	1	10	10	8	4	Do.	Do.	Did not start.	1000	
		5		1	1	10	10	8	4	Do.	Do.	Did not start.	1000	

ARTILLERY DEPOT ST. THOMAS' MOUNT }
19th November 1857.

(Signed) G. ROWLANDSON, Major,
Director Artillery Depot.

ARTICLE 770.

ON THE SUBJECT OF PLATFORMS AND CARRIAGES FOR SIEGE GUNS, ARTICLE *757 MEETING 195, POSTPONED FOR FUTURE CONSIDERATION.

The Secretary lays before the Committee the discussions and experiments held at Bombay on Carriages and Platforms for Siege Guns, and which resulted in the adoption (by authority), of their present equipment of a Travelling Carriage, and a Truck Carriage and Traversing Platform for each Siege Gun, as contained in the Bombay Artillery Select Committee Proceedings, pages 116 to 137, Vol. I, also, a report thereon by Colonel Coghlan at page 48, Vol. III.

OPINION.—The Committee consider the system of a double set of Carriages for each piece, so objectionable, that they are unwilling to give it their sanction, so long as a hope remains of finding a Platform suited to the wants of the Service without necessitating the adoption of a second Carriage. They therefore defer further consideration of the proposal, with a view to the prosecution of further experiments, for the improvement of existing, or the investigation of any proposed better, patterns of Platforms, which experiments they recommend may be sanctioned and carried out by the Superintendent of the Gun Carriage Manufactory, in communication with the Committee.

ARTICLE 771.

ON THE BREAKING DOWN OF THE AXLETREE OF A 9 PDR. GUN CARRIAGE IN ACTION.

The Inspector General of Ordnance and Magazines directs,
(a) Extract from Proceedings No. 7195, 8th Dec. 1857. ^(a) that the report of this additional failure of Axletrees be laid before the Select Committee for future reference.

The undermentioned documents, relative to the subject, are laid before the Committee.

(b) No. 377, 14th November 1857.

1. *Letter^(b) from the Officer Commanding D. Company 3rd Battalion Artillery, Camp Jubbulpore, to the Director of the Artillery Depot.*

Encloses a sketch of a 9 Pdr. Gun axletree and bed broken by firing round shot on service on the 6th Instant, and states that the bed is of teak wood, very dry but not absolutely decayed, the fracture short, indicating sudden rupture.—The iron axle shews a crystalline texture, and some slight indications of unsoundness in one corner.—The gun had travelled over easy ground, and was recoiling four or five feet on a smooth road, and that there was no apparent cause of an unusual character to account for the accident.

(c) No. 471, 4th December 1857.

2. *Letter^(c) from the Brigadier Commandant of Artillery to the Inspector General of Ordnance and Magazines, Fort Saint George.*

Sir,—In forwarding the accompanying Report of the failure of an axletree in action with the column employed against the Mutineers in the vicinity of Jubbulpore,—I have the honor to observe, that although in this instance the age of the carriage may preclude surprise at the accident,—the loss of one of only 2 guns in action, is always so serious, and might at close quarters, against overpowering numbers, have been so critical in its effects, that it alone might properly call for investigation; but when in connection therewith, it

is borne in mind that this is the tenth axletree* of Light Field Carriages that has failed within the last 16 months,—it appears to me imperative that the subject should be closely examined, in order to the application of a sufficient remedy to so fatal a defect in our Equipments.

2. It is very rarely indeed, if ever, that such a thing as failure of axletrees in private Carriages is heard of, and the conclusion seems obvious that their frequent failure in our Artillery Carriages, must be attributable to one or other of

two causes, viz. to imperfect manufacture or material, or to insufficiency of size for the strain and shocks to be borne.

3. Axletrees for private Carriages, and I believe also for Artillery Carriages at home, are subjected to a particular process of manufacture, to ensure the utmost strength and tenacity; and, doubtless, we must not expect that our axletrees, made out of common bar iron, without being subjected to a similar process as at home, will prove effective and enduring. If, as is probable,—though I have no means of ascertaining the fact,—axletrees are a special department of the iron works, and the result of a process not known here, or requiring machinery and steam power, not available in India,—it would appear desirable that arrangements were made to obtain supplies from home, such as the Royal Artillery use;—but if capable of effective manufacture in India, the efficiency of the Service—the confidence of our Officers and men in their weapons—the good name of our Service, and the interests of the State, all imperatively require, that no delay should be allowed in the supply of such as may be relied on.

Memo. of failures of Axletrees of Light Field Carriages.

1856.			}	Letters Offr. Comg. Arty. H. S. F.	
8th July	Axletree 24 Pdr. Howitzer	Carriage at Secunderabad.		445, 12th July 1856.	
				Commt. of Arty. 289, 19th July 1856.	
				Mily. Board 2410, 25th Augt.	"
				Established pattern 1852.	
15th Sept.	Axletree 6 Pdr. Waggon.		{	Letters Offr. Comg. H. B. 148,	} Col. Cullen's Pattern.
17th Nov.	6 " Carriage.			17th March 1857.	
3d Dec.	12 " Limber.			Comt. of Arty. 118, 20th March 1857.	
				Officer Comg. H. B. 189, 3d April 1857.	
1857.				" " " 190, 3d April 1857.	
4th March	6 " Carriage.			Commt. of Arty. 170, 21st April 1857.	
16th "	12 " Limber.			Military Board 8472, 27th April 1857.	
31st "	6 " Carriage.			Established pattern.	
27th April,	Axletree 6 Pdr.			Letters Offr. Comg. H. B. 242, 30th April 1857.	} Col. Cullen's Pattern.
	Carriage C. Troop Bangalore.			Commt. of Arty. 190, 6th May 1857.	
				Inspector Genl. 182, 11th May 1857.	
— July,	Axletree 24 Pdr.		{	Letters Officer Comg. Artillery Tonghoo 422,	} 7th July.
	Howitzer Carriage B. Company 3d Battalion.			Commt. of Arty. 316, 28th July, Select Committee pattern.	

6th Nov. Axletree 9 Pdr. Gun } Letter Officer Comg. D. Company 3d Battalion
 Carriage D. Company 3d } No. 354, 9th November 1857, Colonel Cullen's
 Battalion, Jubbulpore. } Pattern.

ARTILLERY DEPOT, }
 ST. THOMAS' MOUNT, }
 4th December 1857. }

(Signed) G. ROWLANDSON, Major,
Director Artillery Depot.

OPINION.—The Committee are of opinion that the present axles are not sufficiently strong, but in the expectation of further information, defer the determination of the exact increase to be recommended, until their next Meeting.

ARTICLE 772.

ON A GARRISON CARRIAGE AND PLATFORM FOR A 68 PDR. GUN.

The Inspector General of Ordnance and Magazines acknowledges^(a) the receipt of the Proof Report of a Garrison Carriage and Platform for a 68 Pdr. Gun, and requests to be informed whether it is of the pattern recommended and approved of by the Artillery Select Committee.

2. The iron shod traversing handspikes of the same Carriage and Platform are laid before the Committee for opinion.

OPINION.—The Committee entirely approve of the pattern Carriage, but require further data to enable them to dispose of the question touching the necessity of Trunnion and Garrison plates, in a Tropical climate, to determine which, they propose that two Carriages be made up, of the English pattern, *without the plates*, for exposure on the Ramparts of Fort Saint George, and that as many more Carriages as may be required for the immediate demands of the Service, be constructed with the plates added, as heretofore customary.

2. The Committee recommend the curved iron shod traversing handspike originally in use; the latest pattern, which is cut off blunt, being found ill adapted for the small truck wheels of the Traversing Platforms.

Meeting 196 Article 773.

Plan of the Frame work of the Artificers' Cart, which broke down while on the march from Secunderabad to Kanyetee, between Salkaira &



The entire portion of the rear of the frame from a to b gave way, and when the lashing was removed, the box containing the Artificers' Tools fell to the ground, the iron brace under the centre piece being insufficient to sustain so great a weight, as it was snapped into two.

The shaded part shows the iron braces that have been added, to prevent the box for the Artificers' Tools, having so great a play, but in my opinion if the side frame was continued on so as to form one piece, it would be preferable than the present arrangement of having it divided into two.

J.M.
Marks on the Pole 1852.
No 5.

Signed / J.P. Spinhead. Bt Major
Commandant Detachment of Artillery

Madras Artillery Depot.

ARTICLE 773.

ON THE BREAKING DOWN OF AN ARTIFICERS CART.

The report of the fracture of the framing of an Artificers Cart while on the march from Secunderabad to Kamptee is submitted for the opinion of the Artillery Select Committee, by order of the Brigadier Commandant of Artillery, in a letter^(a) from Major R. Kinkead Commanding A. Company 4th Battalion Artillery, to the Director of the Artillery Depôt, together with sketch* of fracture.

(a) No. 185, 28th Nov. 1857.

* Plate 112.

Major Kinkead in his letter considers, “the position of the Box for the Artificers Tools to be in a very faulty position, placed as it is, so far in rear of the frame, and from the great play thus occasioned, break downs of this nature, must, I fear, occur.”

OPINION.—The Committee recommend that the side framing and centre pole be housed into the axletree case without being cut away, and, if deemed requisite by the Superintendent of the Gun Carriage Manufactory, that iron bands be likewise added underneath.

ARTICLE 774.

CORRESPONDENCE RELATING TO CERTAIN WOODS FOR COMPONENT PARTS OF GUN CARRIAGES &c.

The Inspector General of Ordnance and Magazines directs^(a) the undermentioned correspondence relative to certain Woods, being laid before the Artillery Select Committee.

(a) Extract from Proceedings No. 7645, 17th Dec. 1857.

1. Letter^(b) from the Superintendent of the Gun Carriage Manufactory to the Conservator of Forests Madras.

(b) No. 826, 21st November 1857.

Sir,—When Conductor Bowman visited the Annamullay Forest last year to obtain supplies of Timber for the Gun Carriage Manufactory, he brought back with him some speci-

mens of different woods which he thought might answer for Ordnance purposes, and on subjecting them to the usual test a few days ago, the result shews that they are moderately heavy and very tough, most essential characteristics for Gun Carriage Beams, Poles, Splinter bars, Spokes, and indeed every part of a Gun Carriage.

Thinking this Breakage Report would be interesting to you, I have appended it for your information, and as Teak is universally condemned for Gun Carriages, I am very anxious to know if you could give me an annual supply of these woods to the extent of not less than (5000) five thousand cubic feet of each in log and plank, and if so, could you this year ring a hundred and fifty trees of each kind to be felled next season.

I am aware you will need time to reply to this, but if you can act in anticipation of my application for these Timbers, it would be of great service to the Artillery as there is great difficulty in procuring Saul, and from the immense wastage in using it up, the cost of Saul is great, and in obtaining Peddowk and Peemah from the coast of Burmah, I find considerable difficulty, whereas if these four woods Ven Teak, Vella Naugay, Caunjany and Piangany, are easily procured and in sufficient quantity, it would make this Presidency independent of Burmah for any Timber but Teak which is generally to be found in abundance in the Royapoorum market.

Date of Experiment.		No. of log.	No. of Experiment.	Deflections with					$\frac{F}{L} = \frac{32 b \cdot d^3 \cdot d}{L \cdot W}$	$\frac{S}{LW} = \frac{4 b \cdot d^2}{S}$	Distance of specimen from centre of log.	Wide Register of Timber page.	Weight when dressed			Weight when ready for breaking.			Remarks.
				8 Half cwt. in- cwt. in- cluding scale 30 lbs.	10 Half cwt. in- cwt. in- cluding scale 30 lbs.	12 Half cwt. in- cwt. in- cluding scale 30 lbs.	14 Half cwt. in- cwt. in- cluding scale 30 lbs.	16 Half cwt. in- cwt. in- cluding scale 30 lbs.					lbs.	ozs.	drs.	lbs.	ozs.	drs.	
12th November 1867.																			
		1	1	.5	.6	1.	1.5	....	104	180			1	14	8	1	14	8	Ven Teak broke with 14 weights.
		2	2	.5	.6	.8	1.1	1.8	121	205			1	15	8	1	15	8	Do. " " 16 "
		1	1	.4	.5	.7	.8	1.	172	280			3	4	..	3	3	..	Vella Naugay broke with 22 wts.
		2	2	.4	.5	.6	.7	.9	188	330	Not known.		3	4	..	3	3	8	Do. " " 26 "
		1	1	.5	.6	.8	.9	1.2	146	280			2	14	8	2	11	4	Caunjany broke with 22 weights
		2	2	.4	.6	.8	1.	1.2	146	280			3	..	8	2	11	8	Do. " " 22 "
		1	1	.5	.6	.8	1.	1.3	139	230			2	6	4	2	4	12	Piangany broke with 18 weights.
		2	2	.5	.6	.8	1.1	1.4	132	205			2	5	8	2	3	4	Do. " " 16 "

Ven Teak.

This wood grows to a great height, and thickness in the forest of Annamullay, and can be got in any quantity, it is of a pale red color, close grained and very tough. This Timber was used formerly in the Gun Carriage Manufactory for Spokes, Splinter bars and Poles. It is also used by the Natives for furniture of every description.

Vella Naugay.

This wood grows to a great height, but the greatest girth I have seen is about 6 feet, it is very hard and strong, mostly of a white color; in the old trees, the centre forms a dark brown color with a ring of white encircling it about three inches in thickness all round. This wood is used by the Natives for framing and poles of carts, and is in demand by the Railway Authorities for Sleepers. This wood can be used for Poles, Splinter bars and Spokes.

Caunjany.

This wood has the appearance of Lance and is held in great esteem by the Natives who use it, it is strong and elastic, it is used for cart work, and helms for axes,—This wood if it can be got large enough would make very good Beams for Carriages, Spokes, Splinter bars, Poles—it would also answer very well for staves of lances, spunges &c.

Piangany.

A good strong wood in appearance something like the Ash, the Natives use it for house building, and frame work for carts. This wood if it can be got large enough would answer the same purpose as the *Caunjany*.

(Signed) J. MAITLAND, Major,
Supt. Gun Carriage Manfy.

GUN CARRIAGE MANUFACTORY, }
Madras, 21st November 1857. }

(c) No. 231, 15th Decem-
ber 1857.

**2. Letter^(c) from the Conservator of
Forests to the Superintendent of the Gun
Carriage Manufactory Madras.**

Sir,—I have the honor to acquaint you that on receipt of
your letter, No. and date as per margin,
No. 526, dated 21st Nov. 1857.
I addressed the Assistant Conservator Ana-
mallay Forests, as to his ability to supply the different kinds
of Timber mentioned, and the quantities specified—I now
annex his reply. From this, you will observe, that he ex-
pects to have 100 planks of Rosewood (prepared to your
order) ready early next season.

As to the 4 Timbers referred to in your letter above men-
tioned.

1st Ven Teak, is abundant above the slip.

2d Vella Naga, is abundant below the slip.

3d Canjany, is abundant below the slip.

4th Paingay, is abundant below the slip, but on examina-
tion, I find the specimen in the Office to be very inferior tim-
ber. Nos. 2 and 3 can probably be supplied at less expense
than Rosewood. The first costs about the same as that wood.

From my recollection of the size of the trees, I doubt if
the Canjany can be procured large enough for beams of Car-
riages, though there is much suitable for Poles, Spokes, Splin-
ter Bars &c. The first only attains a *large* size.

I send herewith specimen of No. 3, Canjany, marked 42,
in order that you may judge if the wood will suit your pur-
pose. Be so good as return it when no longer required. I
have not sent Paingay, as it has been much damaged by
insects.

(Signed) H. C. CLEGHORN,
Conservator of Forests.

Letter from Lieutenant R. H. Beddome, Assistant Conservator of Forests, to H. F. C. Cleghorn Esquire, M. D. Conservator of Forests Madras.

Sir,—I have the honor to acknowledge the receipt of your letter No. 208 of the 25th ultimo, with copy of Major Maitland's letter to your address.

2. With regard to the latter portion of your letter, 150 planks of Rosewood have already been cut for the Gun Carriage Manufactory. Out of these, through a mistake on the part of the Contractor, 78 planks have been trimmed too small and are consequently rejected and will be sold by auction; however the remaining 72 contain in the aggregate, upwards of the 1500 cubic feet promised by Captain Hamilton. I am nevertheless having 28 more planks cut which will complete the 100. Major Maitland stated that he did not require this timber till next season, and as the Rosewood requires much shade whilst seasoning, I am having it deposited in safe shady places by the road side in the forest, it can be slipped and despatched early next season.

3. With regard to the 2d para of Major Maitland's letter, all the four timbers that he requires can be furnished from our forests. The first "Ven Têk" (*Sagerstrænia microcarpa*) grows abundantly and to a large size in the Government portion of the forest near Toonacadavoo. The second Vellay Naga (*Conocarpus latifolius*) besides growing in our forests is plentiful in the jungles at the foot of the slip. The third "Canjany" (*Strychnos nux vomica*) is abundant in the jungles at the foot of the slip, (this is not found in the Government portion of the forests near Toonacadavoo, it however grows in the Numbody's forests near the Elephant Station, though rare.) The fourth "Paingay" (*Dalbergia paniculata*) is common both in our forests on the hills, and in the jungles at the foot of the slip. The three latter timbers can therefore be easily supplied, and at less expense to our department than rosewood; Ven Têk, however, (only being

procurable above the ghât) will cost us in slipping and carriage the same as rosewood; this can be borne in mind in settling the price per cubic foot of these timbers.

4. Regarding the native names furnished by Major Maitland—of the first two timbers there can be no doubt. The native name of the third “Canjany” is, I believe, peculiar to these parts, it is however, always given by the Karders for the *Strychnos nux vomica* “Yettimaram” the recognized tamil name for the *Strychnos nux vomica* is by them without exception applied to *Hydnocarpus inebrians*. The timber of *Strychnos nux vomica* is I know universally esteemed—it is much sought after by the natives in the Northern Circars for house building—as from its bitter qualities white ants will not touch it. Amongst the specimens of woods from the Godavery jungles that I lodged in your office at Madras, there is a piece of this timber No. 42 which might be forwarded to Major Maitland, which would prevent any doubt on the subject—of the fourth “Paingay,” I have little or no doubt, it is known to all here as the “*Dalbergia paniculata*” and the handles of axes are always made from it, for which reason it was probably brought to Major Maitland’s Overseer’s notice. This wood in the Godavery forests was subject to the attack of an insect, which gave it a most peculiar appearance, it seemed to have circular layers of pith-like substance between the sound timber (Vide my Specimen No. 44 from the Godavery jungles) several trees examined by me were the same, and the wood cutters reported the wood as worthless—it was called by them “*Porilla sopra*” the word *Porilla* being—they informed me in signification of this ringed appearance; at the time I fancied that it was the natural feature of the wood, though I now attribute it to the attack of some insect. The same wood here is apparently free from it. In the Godavery jungles I found the tree in full flower, (specimens of which are amongst my Leguminous plants in your office) here I have only seen it in leaf, though I have

no doubt of the tree being the same i. e. the "Dalbergia paniculata;" I enclose you a specimen of the leaf.

5. Of the "Vellay Naga" the "Cangary" and the "Pain-gay," I can immediately have the number of trees required by Major Maitland ringed. I however would recommend their being felled at once—of the "Ven Tèk," as the tree only grows up in the Forest, and the Establishment is now quitting, I would propose its being deferred, however, if urgently required, it can be done. There are now 9 well seasoned logs of this last mentioned timber, of Gun Carriage dimensions, lying at the side of the cart road, in the forest. Has Major Maitland made trials with the "Vengay" (*Pterocarpus marsupium*)? If not, I could forward him a log when opportunity offers. It grows in such great abundance, and of such fine dimensions in our forests. In central India this wood (there known as Beejasa) is very highly prized and considered second only to Teak. I should be very much obliged if you would forward me a copy of Major Maitland's breakage report.

TOONACUDDOO, }
3d December 1857.

(Signed) R. H. BEDDOME,
Asst. Consr. of Forests.

(d) No. 884, 17th Decem-
ber 1857.

3. *Letter^(d) from the Superintendent of the Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines.*—Forwards copy of the above correspondence and requests that the subject may be laid before the Artillery Select Committee.

OPINION.—The Committee fully concur in the suggestion of the Superintendent of the Gun Carriage Manufactory, and earnestly recommend that the utmost scope and facility be accorded for the fullest trials of these, and any other of the numerous promising descriptions of timber to be found in the extensive forests on the Western Coast or elsewhere;—Reports of the same to be submitted for the information of the Committee.

ARTICLE 775.

ON HAVING THE DOVETAIL OF LIGHT FIELD CARRIAGES IN A SEPARATE PIECE, ATTACHED TO THE CHEEKS BY MEANS OF SCREWS, PROPOSED BY DEPUTY ASSISTANT COMMISSARY CURRAN.

The Inspector General of Ordnance and Magazines directs^(a) the correspondence and sketch* relative to the above proposition being laid before the Artillery Select Committee.

(a) Extract from Proceedings No. 7645, 17th December 1857.
 (b) No. 882, 16th December 1857.
 * Plate 113 Page 634. 1. *Letter^(b) from the Superintendent of the Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines.*—Forwarding letter and sketch* from Mr. Curran, shewing proposed method of forming the dovetail of Light Field Carriages, is laid before the Committee.

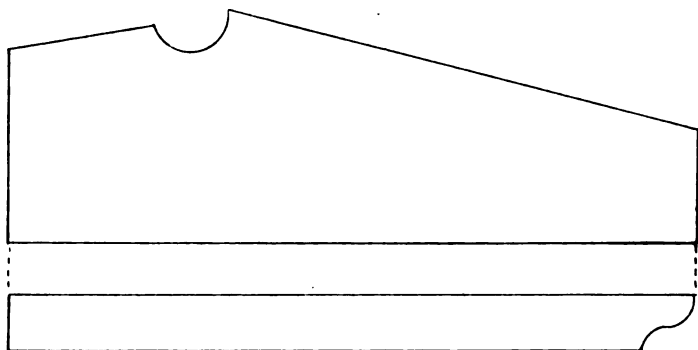
The advantages expected by Mr. Curran from the proposed method would be,

- 1st. A good deal of labor saved.
- 2d. Cheeks could be cut out of smaller scantling by $\frac{5}{8}$ inch, and,
- 3d. Less liability of failures in firing.

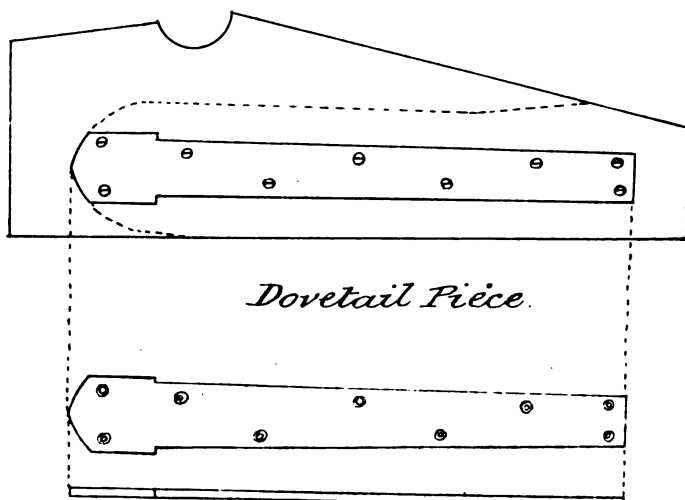
OPINION.—The Committee recommend that cheeks which have failed in the joint of the dovetailing be repaired in the way suggested by Deputy Assistant Commissary Curran, but prefer postponing the record of their opinion on the general question of originally constructing them in the proposed method, until they have further information on the subject.

Artillery Select Committee *Plate 113.*
Meeting 196, Article 775.

*Cheek as proposed without
the Solid Dovetail.*



*Cheek shewing the Dovetail in a
separate piece, screwed on as proposed.*



Scale 1 Inch to a Foot.

Remarks of the Inspector General of Ordnance on Proceedings of Artillery Select Committee, in Meetings 195 and 196, Articles 757 to 775.

I. PROCEEDINGS IN MEETING 195, ARTICLE 757.

Artillery Records
Page 583.

1. *As the question in this article is taken into consideration in a subsequent Meeting, (196, Article 770) I refer thereto for my views.*

II. PROCEEDINGS IN MEETING 195, ARTICLE 758.

Artillery Records
Page 385.

On Metal Fuzes proposed by Lieut. Gloag, vide remarks on Article 769, Meeting 196.

III. PROCEEDINGS IN MEETING 195, ARTICLE 759.

Artillery Records
Page 591.

On the substitution of Sheet Iron for wood in the construction of the Ammunition Boxes of Light Field Batteries, proposed by Lieut.-Colonel Moore, C. B.

1. The Select Committee report unfavorably on the proposal on account of the additional weight, and do not recommend an experiment.

2. I do not consider that the question should be set aside in this way, I think an experiment should be tried with the Corrugated Galvanized Iron or Copper employed on those excellent Boats, Carts &c. set forth in the pamphlet written by Colonel Eyre, C. B. explaining the inventions of Mr. Francis - Citizen of the United States. It appears to me that the Corrugated Iron or Copper Sheet prepared in the way explained in the Pamphlet promises to be of great Military importance in all Military Carriages, and I recommend further enquiries being made, and specimens of the Carriages, Carts and Metal Sheeting obtained.

IV. PROCEEDINGS IN MEETING 195, ARTICLE 760.

Artillery Records
Page 593.

1. *The proposal to substitute Pack Boxes for Ammunition Waggon's originated with the Officer Commanding the Forces in Persia. and there*

appears to be no doubt that, for a country like that around Bushire, the Pack Boxes carried on Camels, are far preferable to the Waggon drawn by Horses. The Honorable Court in the 26th para. of the Military letter to the Government of India No. 43, dated 30th May 1849, expressed themselves as follows :—

“ It is however desirable to circumscribe as much as possible (consistently with efficiency) the number of Wheel Carriages with an Army particularly in India, where made roads are seldom to be met with and other obstacles are numerous, and it is our wish that the Military Board take into consideration how far it is practicable to provide other means of transport for the conveyance of Extra Gun Ammunition, or materials, for preparing the same, at the shortest notice with the parks of Artillery, and also that your Government call upon the Government of Madras and Bombay to report in what manner the same objects have usually been obtained by Forces in actual Field Service at these Presidencies in time of War.”

2. Major General Montgomerie, C. B., Commandant of Artillery at the time this instruction was received reported as follows :—

“ I beg to state that the whole of the Siege Train Ammunition has always been carried with Forces in the Field on Bullocks, the Shot and Shells loose in gunny bags and the materials for preparing Cartridges in barrels; two forming a load.”

“ With respect to the mode of carrying spare Ammunition for Troops and Batteries, it has been usual to carry a certain quantity on spare Waggon allotted for that purpose, but the main portion has been carried on Bullocks.”

“ As a general rule every thing that can be divided into Bullock loads should be so carried, and I am of opinion that it is advisable to continue that mode of conveying

“Ammunition in all operations in an open country like the Deccan, of course in operations in a hilly country like Coorg, or a swampy one like Burmah, a different means of conveying Stores must be adopted, as Bullocks may not answer, but as half a moderate Bullock load is a convenient weight to be carried by hand or placed in boat, it is the best way of calculating and arranging Stores and Ammunition.”

“In a large Force and with a Siege Train especially, there will be many bulky articles requiring carts, but as a general rule the fewer carriages in a campaign the fewer difficulties.”

“I would observe that in the remarks I have made above, I have in view the system followed in the Hyderabad Subsidiary Force, which was in the Field from 1812 till 1818, and when I mention that that system was formed from the experience gained in the Campaign under General Wellesly in 1803 and 1804, I conceive I have said enough to establish it as the best.”

3. I therefore recommend further consideration being given to the suggestion for having supplies of pack boxes adapted for different kinds of animals according to the nature of the country, I also recommend that the description of metal used for the carts &c., recommended in the pamphlet printed by Colonel Vincent Eyre, C. B., be taken into consideration, in the full expectation that the Corrugated Galvanized Iron will be found most useful for Ordnance purposes and especially for Ammunition Boxes.

V. PROCEEDINGS IN MEETING 195, ARTICLE 761.

Artillery Records
Page 599.

*On an Expanding Bullet for the two
grooved or Brunswick Rifle.*

1. The report on the Bullet was submitted by me in a Memorandum to His Excellency the Commander-in-Chief

dated 6th September 1857, copy as follows, with His Excellency the Commander-in-Chief's reply.

MEMORANDUM.

The Inspector General of Ordnance, submits for the consideration of His Excellency the Commander-in-Chief, the following observations on the report of the Artillery Select Committee in Meeting 195, Article 761, and on the Draft G. O. enclosed in the Adjutant General's Memorandum dated 6 P. M. of 5th September 1857.

The Elongated or conoidal shaped Bullet of the form proposed by Mr. Gubbings, B. C. S., has, at Alygurh (with the Rifles of the late 9th Battalion Native Infantry) and at Madras been found to range well from the two grooved or Brunswick Rifle and as the nature of the Rifling and number of grooves affect the flight of the Bullet, one uniform shaped Bullet is not adapted for all Rifles, and the one proposed by Mr. Gubbings (slightly modified by Majors De Sausmarez, and Rowlandson) appearing to be the most suitable for the two grooved Rifle, may be adapted with advantage until a superior kind of Bullet is discovered.

The Inspector General would at once assure His Excellency that if approving of the Bullet a supply can be prepared for the Rifles, but there is a practical difficulty, which will be explained, if however the Commander-in-Chief gives the order, it shall be readily and zealously carried out.

The Inspector General believes that moulds can easily be prepared in any number and a supply sent to Calcutta, besides retaining a sufficient number at Madras.

With regard to the necessity of altering the sights of the Rifles adverted to by the Select Committee, the Inspector General observes that admitting the value of sights, yet the proper distances have to be ascertained from practice, the men have also to be practiced in firing with the Bullet and in judging distances, and the Officers can in this course, easily

mark on the sights now on the Rifles, the distance ranging as learned from practice, a very useful kind of training, indeed each piece will be found to require its own elevation, and with well trained men, sights diminish in value as far as respects the ranges in yards marked thereon, so much is this understood that every Soldier now retains the piece with which he is trained.

With respect to the draft G. O. the Inspector General has already ordered 500 rounds of Ammunition per piece (the number fixed by His Excellency in Calcutta) to be prepared for shipment, of these there will be 250 belted Balls with blank Cartridges with $2\frac{1}{2}$ Drs. and 250 all of Musket Cartridges with $4\frac{1}{2}$ Drs. these being the proportions fixed by para 6 of G. O. C. C. 29th November 1845, No. 71.

The Inspector General submits for the Commander-in-Chief's consideration the propriety of allowing Officers Commanding Rifle Companies to provide patches, charging for the same on Contingent bill (relieving the Ordnance Department from a duty somewhat difficult to do well) and thereby ensuring efficient Patches being also in use with the Soldier.

The Inspector General will also cause the moulds for casting the Belted Balls to be examined, lest by use they have become enlarged, and enlarge the Ball, for its diameter is below that of the bore of the piece, and difficulty in loading (except from bad training as found with the Rifle Muskets) should not be experienced with this size of Ball; that is according to theory.

The Belted Ball is however, far inferior to the elongated expanding Bullet above reported on.

* * * * *

SUNDAY, 8 $\frac{1}{4}$ A. M. 6th Sept. 1857.	}	(Signed) G. BALFOUR, Lt. Col. <i>Inspr. Genl. of Ord. and Magazines.</i>
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Submitted the following Memo.
to the Commander-in-Chief.

From Inspector General of Ordnance and Magazines No. —
dated 6th September 1857.

} His Excellency's order thereon.

The Commander-in-Chief thinks it most desirable that Mr. Gubbings' Ball (modified by Major DeSaumarez) should be supplied to the Madras Rifle Corps proceeding to Bengal, it is much superior to the common spherical Bullet and if the Inspector General can manage to furnish it, the efficiency of the Rifles will be most materially promoted, but His Excellency would still send 250 pounds per man of the Ordinary $4\frac{1}{2}$ drams Cartridges.

Lieutenant General Sir P. Grant is not by any means satisfied that the view taken by the Inspector General in the 5th para is correct, His Excellency is aware that it was only by constant practice that the Soldier could ascertain correctly the range of the old musket, and how the piece carried (high or low, right or left) but he much doubts if this applied to the Rifle and certainly not with the Enfield and Minie—Modern Instructors attach great importance to the sights.

With reference to the Ammunition ordered to be prepared for shipment, His Excellency thinks that 250 Musket Cartridges with $4\frac{1}{2}$ drams are enough, the 250 Belted Balls with Blank Cartridges of $2\frac{1}{2}$ drams are not to be sent.

The Commander-in-Chief quite approves of the propriety of allowing Officers Commanding Rifle Companies providing Patches and charging for the same on Contingent Bills.

His Excellency has the strongest objection to the Belted Ball. He has himself witnessed the difficulty of loading by trained Riflemen after 20 or 30 Rounds of firing

(Signed) W. G. Woods, Lieut. Colonel,
Adjt. Genl. of the Army.

VI. PROCEEDINGS IN MEETING 195, ARTICLE 762.

Artillery Records
Page 605.

On the failure of Beams of 6 pounder Carriages in use with B. Troop at Trichinopoly.

1. I agree with the Committee in considering that the defective state of the Beams cannot be attributed to time in use, that time having only been $2\frac{1}{2}$ years—I also agree with the Committee that the falling off in the specific gravity of the wood whilst in use from $52\frac{1}{2}$ lbs. per cubic foot, the weight when cut out of log at the Gun Carriage Manufactory, is in great contrast with the weight of a cubic foot of the same wood, after being only $2\frac{1}{2}$ years in use when it was reduced in weight to 40, 38, and 36 lbs. respectively, a falling off which, as the Select Committee quietly remark “seems also to indicate defect,” and in this I fully agree; but it is in my opinion an indication of a serious defect viz. insufficient seasoning.

VII. PROCEEDINGS IN MEETING 195, ARTICLE 763.

Artillery Records.
Page 612.

On an alteration in the handles of the Ammunition Boxes.

1. The Committee have at present before them a very full and elaborate report drawn up by the Superintendent Gun Carriage Manufactory on the Carriages of the Royal Artillery lately arrived from England, I recommend the proposed alteration of the handles to the boxes of the Ammunition Carriages of the Madras Carriages to be deferred pending the report of the Select Committee already called for on the construction of the Madras Carriages in reference to the Royal Artillery patterns.

VIII. PROCEEDINGS IN MEETING 195, ARTICLE 764.

Artillery Records
Page 613.

1. There is no objections to the Committee's recommendations being carried out viz., to have one Dwarf Traversing Platform for all Carriages being made up for trial, but this experiment should not be allowed to interfere with the making up of

other Carriages for the immediate requirements of the service.

IX. PROCEEDINGS IN MEETING 196, ARTICLE 765.

Artillery Records
Page 615.

1. The Committee's recommendation to strengthen the Cheek Bolts of the Light Field Carriages may be carried out, the Superintendent Gun Carriage Manufactory, will if Government approve, be called on to submit a clear specification of the new Bolt for insertion in the Order Book.

X. PROCEEDINGS IN MEETING 196, ARTICLE 766.

Artillery Records
Page 616.

On the Bouching of Ordnance.

1. No remarks needed, as the subject is to be re-considered at a future Meeting.

XI. PROCEEDINGS IN MEETING 196, ARTICLE 767.

Artillery Records
Page 618.

On the substitution of an Iron for a wooden Semelle.

1. The decision of Government was given on this question in Minutes of Consultation, No. 292 dated 22nd January 1858, viz., that Iron Semelles should be substituted for wooden ones with Heavy Field 18-Pounder Carriages.

XII. PROCEEDINGS IN MEETING 196, ARTICLE 768.

Artillery Records
Page 618.

On a Bolt with screw nuts for the ends of Pole Limbers.

1. The experiment recommended in this Meeting may be tried with the 6 Troops of Horse Artillery and in some of the Light Field Batteries and reported upon at the end of April 1859.

XIII. PROCEEDINGS IN MEETING 196, ARTICLE 769.

Artillery Records
Page 619.

Metal Fuzes proposed by Lieut. Glog.

1. This experiment with Metal Fuzes having proved unsuccessful and Boxer's Fuzes appearing to be successful, no further remarks are needed.

XIV. PROCEEDINGS IN MEETING 196, ARTICLE 770.

Artillery Records
Page 621.

On the Bombay system of Carriages and Platforms.

1. The Committee recommend further experiments being tried, but as many experiments with Platforms have already been tried in Madras and Bombay, the fuller experiments which the Committee deem necessary should be specified, and then if these experiments be allowed, the Superintendent Gun Carriage Manufactory can then be authorized to make up such Carriages and Platforms as the Committee may desire to obtain for experiment; but I do not advise leaving the question in the unsettled state as proposed by the Select Committee.

XV. PROCEEDINGS IN MEETING 196, ARTICLE 771.

Artillery Records
Page 621.

On the breaking down of an Axletree.

1. The Committee defer giving a final decision pending further information, but as it is desirable that early attention should be given to the pattern of Axletree now in use it be considered in connection with the general subject of alterations which may appear advisable after a comparison of the Royal Artillery Carriages referred to in the report in Article 763 of Meeting 195.

XVI. PROCEEDINGS IN MEETING 196, ARTICLE 772.

Artillery Records
Page 624.

On a Garrison Carriage for a 68 Pounder.

1. The decision of Government was given in Minutes of Consultation No. 292, dated 22nd January 1858 as follows.

“ That two Carriages be made up of the approved pattern
“ without trunnion and garnish plates for exposure on the
“ Ramparts of Fort Saint George, and that as many more
“ Carriages as may be required for the immediate demands of
“ the service be constructed, with the plates added as heretofore
“ customary; this order has been given to the Superintendent
“ who will report the completion of the Carriages,
“ which can then, under an arrangement with the Select Com-

“ mittee, be placed on the Ramparts of Fort Saint George to
 “ be reported upon at such time as the Committee may fix.”

2. This experiment should not interfere with the making
 of Carriages for service.

XVII. PROCEEDINGS IN MEETING 196, ARTICLE 773.

Artillery Records.
 Page 625.

On the breaking down of an Artificer's Cart.

1. The alterations recommended by the Select Committee
 in the construction of the Artificer's Cart may at once be
 sanctioned, but the best kind of Cart and nature of construction
 should be considered by the Committee in connection
 with the report on the Royal Artillery Carriages adverted to
 in the remarks on Articles 763 and 771.

XVIII. PROCEEDINGS IN MEETING 196, ARTICLE 774.

Artillery Records.
 Page 625.

On varieties of woods for Ordnance use.

“ The Committee do not specify the woods but recommend
 “ that the utmost scope and facility be accorded for the full-
 “ lest trials of certain woods and any other of the numerous
 “ promising descriptions of Timber”; now I unhesitatingly
 state that every facility has, during the past 9 years been
 accorded for Testing Timber and this facility will continue
 to be accorded with any woods which may be recommended:
 whatever experiments the Artillery Select Committee or the
 Superintendent Gun Carriage Manufactory or any other
 Ordnance Officer may wish to try with any woods shall, on
 the kinds being specified be most readily authorized, but the
 Government are recommended not to allow large supplies of
 articles to be constructed for service with merely experi-
 mental woods. When the experimental woods are reported
 on as successful, then the woods employed may become estab-
 lished standards; I also suggest that details connected with
 the advantages to be gained from the use of new kinds of
 wood to be placed on record in order that even unsuccessful
 results may be made useful to the service, as some compen-
 sation for the expense in carrying out the experiment.

XIX. PROCEEDINGS IN MEETING 196, ARTICLE 775.

Artillery Records
Page 638.

*On the dove-tail of Light Field Carriages
in a separate piece.*

1. The consideration of this question should be taken up with the report on Royal Artillery Carriages adverted to in remarks on Articles 763, 771, 773,

(Signed) G. BALFOUR *Lieut Colonel*
Inspr. Genl. of Ord. and Magazines.

The Governor in Council proceeds to pass orders on such of the Articles entered in the Proceedings of the Artillery Select Committee above recorded as require to be noticed,

Meeting 195, Article 759.—The suggestion of the Inspector General of Ordnance in regard to the use of Corrugated Iron as applicable to Ordnance purposes will be considered hereafter.

Article 760.—The Governor in Council wishes the Select Committee to give their consideration to the recommendation of the Inspector General relative to Pack Boxes adapted for different kinds of transport.

Article 762.—The Proceedings of the Select Committee on this head, together with the observations of the Inspector General are to be communicated to the Superintendent Gun Carriage Manufactory for report.

Article 763.—The proposed alteration of the handles to the Boxes of the Ammunition Carriages to be deferred as suggested by the Inspector General.

Article 764.—Authority is granted for making up an experimental Dwarf Traversing Platform as proposed—but without interfering with the making up of other Carriages for the immediate requirements of the service.

Meeting 196, Article 765.—Cheek Bolts of Light Field Carriages to be strengthened as proposed.

Article 768.—The experiments recommended by the Select Committee to be carried into effect as suggested by the Inspector General.

Article 770.—The Governor in Council concurs with the Inspector General in his remarks upon this question.

Article 771 and 773.—The attention of the Select Committee is directed to the Inspector General's remarks on these heads.

Article 774.—The Governor in Council observes that only such woods as shall have been previously authorized by Government are to be used for the purposes of the Gun Carriage Manufactory, at the same time every facility is to be afforded for experiments on other woods—but only to such extent as may be necessary for fair trial—and without in any way interfering with the regular course of the service. The details of every such experiment, and the results, are required to be carefully specified, and entered on the records of the Select Committee.

MEETING 197, ARTICLE 776.

Special Meeting.

MEETING 198.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL P. HAMOND, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot Saint Thomas' Mount, 26th May 1858.

PRESENT.

COLONEL J. W. CROGGAN, *Commanding 5th Battalion Artillery.*

MAJOR G. W. Y. SIMPSON, *Acting Principal Commissary of Ordnance.*

MAJOR G. BRIGGS, *Acting Director Artillery Depot.*

MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*

MAJOR G. ROWLANDSON, *Acting Superintendent Gun Powder Manufactory.*

MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*

CAPTAIN J. D. SCOTT, *2nd Battalion Artillery.*

ARTICLE 777.

ON THE SUBSTITUTION OF PACK MULES FOR WAGGONS, FOR THE CARRIAGE OF AMMUNITION &c.—PLATE 114.

The Adjutant General of the Army forwards^(a) printed documents, with instructions for the Select Committee to report upon the sub-

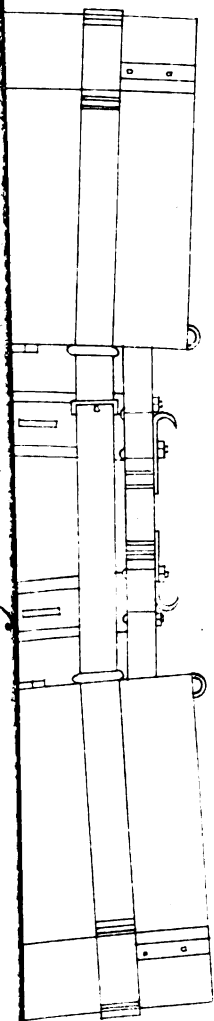
(a.) No. 6933, 24th December 1857.

Artillery Select Committee.

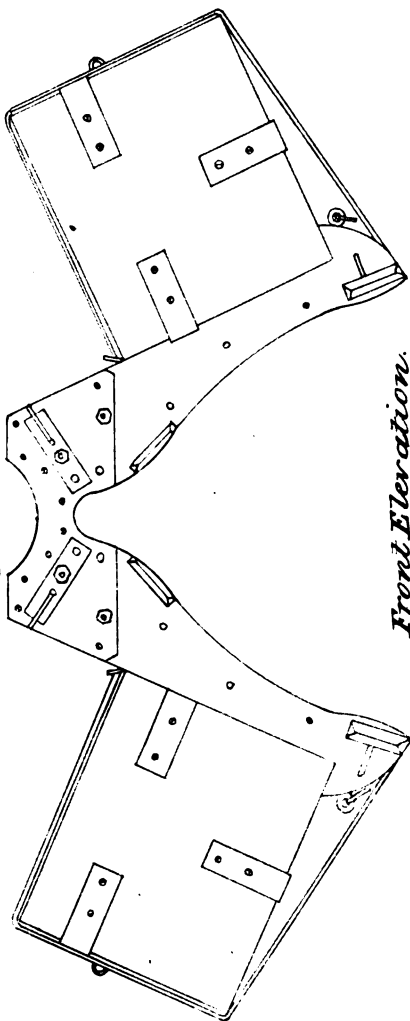
Page 646.

Meeting 198 Article 777.

Plate 114.

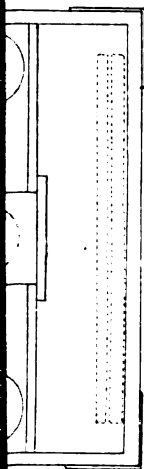


Plan of Boxes & Saddle.



Front Elevation.

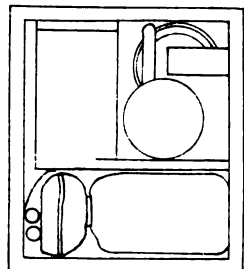
Artillery Select Committee.



Plan showing fittings.

Contents

1. Bag Fuse
1. Cartouch canvas
2. Cartridges bursting SS
6. " " filled G. Brass
1. " " empty
8. " " Priming
8. Fuses filled Shrapnell
2. Port-fires
2. Shells filled Shrapnell
1. Shot case G. Brass
3. " " solid fixed.



Section.

W^t of Box empty lbs 21
 " " filled " 92½

J. B. del.

ject, and to furnish drawings, dimensions, and a description of the best pattern of box that can be devised.

The undermentioned documents are also laid before the Committee.

(b.) No. 615, 29th December 1857. 1. *Letter^(b) from the Director Artillery Depôt, to the Secretary Permanent Artillery Select Committee, Bombay.* Requesting to be favored with drawings and description of the Boxes recommended by the Bombay Artillery Select Committee, as the Madras Committee, in considering the subject in September 1857,

(c.) No. 12, 23d May 1857. *Artillery Records, Artillery Select Committee Proceedings Page 595.* entirely concurred in the opinion and recommendation of the Bombay Committee, as set forth in their letter^(c) to the Adjutant General of the Army, Mahableshtar.

(d.) No. 9, 4th February 1858. 2. *Letter^(d) from the Secretary Permanent Artillery Select Committee, Bombay, to the Director of the Artillery Depôt.*—Forwarding drawings &c. of Pack Boxes for Field Artillery Ammunition carried on Mules.

OPINION.—The Committee observe that the question referred to in the above letter^(e) has already formed the subject of deliberation at Meeting 195, Article 760^(f) of the 4th September last;—the opinion then expressed (in which the present Committee fully concur) is for convenience of reference again recorded as follows:—

“ The Committee concur in the views of their Brother Artillerymen in deprecating the idea of interfering with the extra Waggon, which they consider essential to the efficiency of our organization, but the facility suggested for adopting Pack Cattle carriage on emergency, in providing a supply of Pack Boxes, they consider very desirable.”

2. Plans of Pack Boxes with mode of packing Field Gun Ammunition therein, accompany. Plate 114. The

Committee approve and propose to adopt the Box designed by the Select Committee of Artillery Officers in Bombay, which appears to be well adapted to meet the objects of the required service.

Observations of the Inspector General of Ordnance on Article 777.—The Inspector General of Ordnance has already submitted his observations in full on this question, when reported on by the Select Committee in Article 760, in Meeting 195^(g) and the subject is now before Government.—The question is important and requires to be far more fully considered, but as the commencement of a series of experiments, there is no objection to a few boxes of the pattern now proposed by the Select Committee being made up, and the weights empty and filled, ascertained, also a few Cattle lent for two months to test the fitness of the Boxes, and to determine the best pattern of Pack Saddle.

Orders of Government on Article 777.—Trials proposed by the Inspector General of Ordnance sanctioned.

ARTICLE 778.

ON ALTERATIONS AND ADDITIONS IN ORDNANCE CARRIAGES &c. ADOPTED IN THE ROYAL SERVICE.

(a.) Extract from Proceedings No. 7857, 24th December 1857. The Inspector General of Ordnance and Magazines forwards^(a) accounts of alterations and addition in Ordnance Carriages and Equipments &c. adopted in the Royal Service since last Return, for submission to the Select Committee.

Account of alterations and additions in Ordnance Carriages &c. adopted in the Service since the last Return.

WAR OFFICE, WHITEHALL GARDENS,

31st May 1857.

1. *New pattern Snap Caps of Leather and Iron.*

Ordered 10th June 1856 Z 263

2. *Quill Friction Tubes for Naval Service.*Ordered 16th July 1856 $\frac{275-26}{1}$

3. *Hand Leathers for Limbers and Carriages of Field Batteries to be re-issued, and in future considered part of Equipment.*

Proposed by Colonel Anderson, R. H. A.

Recommended by the Ordnance Select Committee.

Approved 13th August 1856 $\frac{271-4}{163}$

4. *Gyn 18 feet to be substituted for the 20 feet Gyn, and the 16 feet Gyn to be retained for exceptional cases where the 18 feet Gyn cannot so conveniently be used.*

Proposed by Serjeant Major Williams, R. A.

Recommended by the Ordnance Select Committee.

Approved 10th September 1856 Z $\frac{662}{211}$

5. *New pattern Rivets for fixing wood bottoms to Shot and Shell.*

Proposed by Captain Boxer, R. A.

Recommended by the Ordnance Select Committee.

Approved 22nd September 1856.

6. *Shells 10 Inch, Naval, fitted with Metal Plugs to be issued in lieu of 10 inch Hollow Shot with Fuzees in the proportion $\frac{2}{3}$ the number of Shells issued.*

Ordered 19th November 1856 $\frac{275-23}{112}$ 7. *Metal Fuze for Naval Service.*

Proposed by Captain Boxer, R. A.

Ordered 21st January 1857. 6.132 N.

8. *Ammunition Barrow with two Wheels in lieu of the Single Wheel Barrow.*

Proposed by Colonel Tulloh, R. A.

Recommended by the Ordnance Select Committee.

Approved 24th January 1857 $\frac{137-1}{42}$

9. *Ammunition for 10 inch Pistol Carbine, and the 10 inch Cavalry Pistol.*

Ordered 31st January 1857 $\frac{27,344}{3,4}$

10. *Kerr's Metallic Covers for Small Arm Cartridges.*

Ordered 19th February 1857. 6219 N.

11. *Medicine Cart of new construction.*

Proposed by Captain Clerk. R. A.

Ordered 2nd March 1857 $\frac{8,3}{C}$

12. *Vent Plugs for Guns for Naval Service.*

Proposed by Captain Hayes, R. N.

Ordered 20th April 1857. 6678 N.

13. *The Barrel of Chevaux de Frize to be rivetted instead of brazed in future construction.*

Proposed by Mr. D. Payne.

Recommended by the Ordnance Select Committee.

Approved 9th April 1857 $\frac{3,4}{F}$

(Signed) W. CATOR, D. G.

OPINION.—To be recorded and printed in continuation of previous similar papers, as before recommended, vide Article 726, Meeting 192, Page 510, Artillery Records, also Article 745, Meeting 194, Page 549.

Observations of the Inspector General of Ordnance on Article 778.—The papers referred to should have accompanied the Report of the Select Committee, but the papers referred to are the orders issued by the Board of Ordnance, and since the abolition of that Board, by the Secretary of State for War, sanctioning alterations in the Ordnance Equipments in England. The orders previously sent out here have been printed and will be distributed, on the orders now referred to being also printed. The attention of Government will again be requested to the importance of having these orders more frequently and regularly sent from England.

ARTICLE 779.

ON RAMMER HEADS AND HANDLES &c. FOR TOOLS, MADE
OF BURMESE WOOD.

The Inspector General of Ordnance and Magazines directs^(a) that a few Rammer Heads and Handles &c. for Tools, made of Burmese wood (Yendaik) received from the Ordnance Officer at Moulmein, may be submitted to the Artillery Select Committee.

OPINION.—The Committee recommend that the Rammer Heads be used with the nearest Batteries; Reports to be furnished six months after coming into use;—and that the Handles &c. for Tools be forwarded to the Gun Carriage Manufactory for trial and Report.

Observations of the Inspector General of Ordnance on Article 779.—The Rammer Heads may be tried and reported in any way the Brigadier Commandant of Artillery may see fit, to test the fitness of the wood.

The wood for handles for tools can be tested under the orders of the Inspector General of Ordnance, in the different Workshops of the Ordnance Department.

Orders of Government on Article 779.—Trials proposed by the Inspector General of Ordnance sanctioned.

ARTICLE 780.

ON THE FAILURE OF A 10 INCH WOODEN HOWITZER
CARRIAGE.

The Inspector General of Ordnance and Magazines forwards^(a) correspondence relative to the failure of a 10 Inch wooden Howitzer Carriage at the Annual Artillery Practice at Head Quarters, and directs the same being submitted for the consideration of the Select Committee.

The undermentioned Documents are laid before the Committee.

(a.) No. 8497,
24th April 1857.
No. 9873,
25th February 1858.

(b.) No. 123,
24th March 1857.

1. *Letter^(b) from the Commandant of Artillery to the Secretary Military Board.*—

Forwarding Sketch of the injury sustained by a 10 Inch Howitzer wooden Carriage, and copies of letters^(c) from Colonel P. J. Begbie, Commanding Artillery Centre Division; and observes that, “It seems doubtful if the fracture occurred

(d.) *Extract from letter from Colonel Begbie No. 100 dated 5th March 1857.*

“The trail transom of the 10 Inch Howitzer Carriage lately used at the Practice carried on under my command became, in my opinion split from placing the moveable blocks over the small hind wheels immediately beneath the trail transom, to prevent the very great, and dangerous recoil of the Piece, it being nearly as much as eight yards on the level and hard terre-plein of the Battery when firing with service charges.”

“from the cause suggested by Colonel Begbie^(d), the upper surface of the moveable blocks, appears to lie even with the lower surface of the Transom, and the pressure not greater on the

“rear (which is broken) than on the fore part, when the blocks are forced home by the revolution of the wheels in recoil.”

(e.) No. 292,
17th April 1857.
No. 304,
22nd April 1857.

2. *Letters^(e) from the Superintendent of the Gun Carriage Manufactory to the Secretary of the Military Board.*—Re-

porting (in letter No. 292) the Carriage trail transom being broken, and the axletree for truck cracked through both arms; both requiring to be renewed;—and (in letter No. 304) states that, he cannot account for the remarkably long and violent recoil, something far beyond ordinary, unless there is something peculiar about the powder; and that “the pattern appears altogether objectionable, either a parallel cheek wooden Carriage like our Heavy Field, or Iron Carriages would be better, as the construction of the wooden 8 and 10 Inch established pattern Howitzer Carriage is complicated, without any advantage gained from it that I can perceive.”

(f.) Artillery Records
Pages 3, 9, 13, 588, 693,
and 95th old series; and
pages 24, 245 and 294
new series.

3. *Proceedings^(f) of the Select Committee on the subject of Wooden and Iron Carriages.*

OPINION.—This being the first instance of fracture of these Carriages, the Committee are disposed to consider it an isolated case, not attributable to any faulty construction, but the result of accident.

Observations of the Inspector General on Article 780.—The Inspector General observes that the 10 Inch wooden Howitzer Carriage has seldom been used, and hence few failures have been experienced:—The Inspector General doubts whether wooden Howitzer Carriages, of a suitable pattern for the woods or construction of this Presidency, will stand severe firing, and would advise a wrought iron carriage as the one most likely to be efficient, until a proper wooden Carriage has been fixed on.—A few 10 Inch Howitzer Carriages, Wooden and Iron, may be used at the next Annual Practice and their relative merits reported on.

Orders of Government on Article 780.—Trials proposed by the Inspector General of Ordnance sanctioned.

ARTICLE 781.

ON THE DIFFERENCES IN CONSTRUCTION BETWEEN THE CARRIAGES AND PATTERNS OF STORES OF THE ROYAL AND MADRAS ARTILLERIES.

The Inspector General of Ordnance and Magazines forwards^(a) Drawings and comparative Statements of the differences in construction between the Carriages of the Royal and Madras Artilleries, and requests the same may be submitted for the consideration of the Select Committee.

The undermentioned Documents are laid before the Committee.

- (a.) No. 10237, 8th March 1858.
No. 239, 8th May 1858.
No. 270, 12th May 1858.
- (b.) No. 8606, 19th January 1858.
1. *Letter^(b) from the Inspector General of Ordnance to the Brigadier Commandant of Artillery.*—Stating that arrangements had been made for

the examination of the Carriages of the Royal Artillery by the Superintendent Gun Carriage Manufactory, and the Stores and Equipments by the Director Artillery Depot.

(c.) No. 149,
1st March 1858. 2. *Letter^(c) from the Superintendent of the Gun Carriage Manufactory to the Inspector General of Ordnance.*

(a.) 2nd January 1858. I have the honor to acknowledge your
(b.) 12th " " letters Nos. 7959^(a), and 8469^(b), calling for a report on the Royal Horse Artillery Carriages, lately received from England, which were sent to the Manufactory for some slight repairs and to be painted.

2. With a view to afford all the information called for, I have prepared Plans of the entire Equipment, including Carriages, Waggons and Carts of all kinds attached to the Troop, and still further to meet your wishes I have drawn up a Comparative Statement* of the particulars shewing the distinctions between the Royal and Madras constructions which I think will be found to comprehend every point of difference between the two patterns.

3. In most of the wooden component parts, the dimensions of both patterns so nearly coincide I shall be able to supply seasoned Half wroughts for the Royal Artillery from what I have prepared for the Madras Carriages, with the exception of the Royal Artillery wheels, for which I have already cut up some Naves, Spokes and Felloes of the patterns they use, which differ considerably from the Madras patterns.

4. It is difficult to answer with accuracy your query as to how long the Royal Artillery Carriages will last, as that will of course depend upon the exposure and wear and tear to which they are subjected. What might bear amount of work in the temperate zone may not answer within the tropics, and I am inclined to think that the Royal Artillery

* For "Comparative Statement," vide Meeting 199, Article 789.

Carriages will not prove so durable as those made in this country for the following reasons :—

5. Experience has already taught us that Deal wood will not stand exposure in India, it may therefore be affirmed with certainty that their boxes are not adapted for Ordnance work in this country.

6. Fifty years trial at Madras has led us to prefer a metal nave and ring tire, to the wooden nave and ring tire in use in Bengal. The Royal Artillery use a wooden nave and the streak tire, which I was informed by the Royal Artillery Troop Wheelwright did not answer even in Turkey; the wheels of the Carriages of the Troop he then belonged to, when taken out for exercise at Scutari having literally fallen to pieces, but before hearing this workman's anecdote, in

(c.) 8th October 1857.

my letter No. 692^(c), I predicted that a streak tire would not answer in India, and after narrowly scrutinizing the Troop wheels which are very neatly turned out. I must again state my conviction that they will not stand exposure and knocking about for 12 months in the hot season without becoming unserviceable.

7. If the Timber of which the Cheeks and Beams of the Royal Artillery Carriages are made had been first well seasoned in India, they might have answered their purpose, but I am doubtful whether they will stand the scorching hot winds and baking sun to which they may be exposed if the Troop takes the field. However, I only speak positively about the Deal wood boxes and streak tired wheels, and less confidently of the Cheeks and Beams.

8. There are some differences between the two patterns in which I think the Madras might follow the practice of the Royal Artillery with advantage, for instance the method of tabling the Cheek to the Beam appears to be stronger than the Madras way of dovetailing, but even if it is not, tabling would prevent the front of our Beams cracking where the dovetail enters, which gives our Carriages an ugly appear-

ance and may sometimes raise a doubt as to the soundness of the material used in their construction.

9. The shape of the Royal Artillery Axletree body, sloping gradually from the shoulders to the centre, appears to me superior to ours, and having the axle arms bent down is decidedly an improvement, and as I believe the Madras Artillery stand quite alone and are wrong in having their axle arms straight ; I would suggest an immediate change to the practice of the Royal, Bengal and Bombay Artillery.

10. The upper and under trail plates of the Royal Artillery Carriages are much longer than those in use in India and tend to strengthen the Beams at the bend of the trail, acting as clamps at that part which needs support.

11. The Royal Artillery carry their small stores on a separate carriage instead of having small store boxes on each limber—one consequence would be that if a necessity arose to detach for a time two or more guns they would be without any tools.

12. Experience will soon shew that for this climate there are too many leather straps and leather shoes on the Royal Artillery Carriages, and that it will be necessary to substitute cotton rope to fasten on the Ammunition Boxes to the limbers and waggons.

13. There are some points peculiar to the Madras constructions which have been and I think still are justly regarded as improvements, viz.

1st. Vertical eyes for Trace hooks on the splinter bar to facilitate unhooking when a wheel horse has fallen down.

2ndly. The Pintle loop on a swivel to prevent accidents to the limber, if the carriage should be upset.

3rd. The projection of the centre frame in rear of the Limber Axle case, called the short pole, to take the weight of the limber off the necks or backs of the wheel horses, and give facility in limbering up.

It would I think be well if these improvements were introduced into the Woolwich, Bengal and Bombay Carriages, as they have been found useful by the Madras Artillery.

14. I have added a Plan of a Royal Artillery 24-Pounder Howitzer Carriage which was received at Madras on the return of the first expeditionary Force from China.

(d.). No. 236,
6th May 1858. 3. *Letter^(d) from the Superintendent of the Gun Carriage Manufactory to the Inspector General of Ordnance.*—Forwarding Plans of the 9 and 24-Pounder Royal Foot Artillery Carriages &c., together with a comparative Statement* of the particulars shewing the distinctions between the Royal and Madras constructions.

OPINION.—The Committee feel it impossible on the present occasion to go into the consideration of the whole subject of comparison between the Madras and Royal Artillery Carriages in detail, but take up two of the points noticed in the Superintendent's letter, which they deem of immediate importance;—and of the advantages of which they entertain no doubt, having already had extensive experience of their value in the Service, viz :—

1st.—Tabling of the Cheeks to the Beam instead of dovetailing.

2nd.—The best description of Axle-arm.

2. They observe that the system of tabling the Cheeks to the Beam was in use for many years in the Regiment, as it still is in the Royal and Bengal Artilleries and was exchanged for dovetailing under the supposition that the latter was an improvement upon the former, but the Committee have since seen reason to consider it desirable to re-introduce tabling, and after full and mature deliberation on the subject of Axle-arms, they are of opinion, that it is advisable to revert to the Axle-arm formerly obtaining in the Regi-

* Vide Meeting 199, Article 789.

ment, and known as "Cullen's Axle" having the upper line sloped downwards and the lower line in prolongation of the lower surface of the axletree, as shewn in the annexed drawing. (Plate 115.)

Extract from Observations of the Inspector General of Ordnance on Article 781.—3. The Superintendent of the Gun Carriage Manufactory pointed out several differences, but the Select Committee only advert to two questions, viz. *Tabling the Cheeks* and the *Axle-arms*.

4. The Proceedings of former Select Committee on the respective merits of *Tabling* and *Dovetailing* should have been stated more fully, in order that the question might if deemed advisable, be referred for the opinions of others.

5. The change of *Axle-arms* as proposed by the Select Committee is, in the opinion of the Inspector General extremely unadvisable.

6. In 1849, there were many kinds of *Axle-arms* in use with the Artillery and many kinds of wheels; and after immense labor and great anxiety, the whole of the *Axle-arms* were assimilated and one wheel made suitable for all Carriages; now, to risk this great uniformity by an alteration of our axle-arm at a time when the Ordnance service is on the greatest stretch to meet the public wants, appears to the Inspector General most inexpedient;—But another consideration arises,—what instances of objections can be urged against the present axle-arm; the Inspector General has no recollection of any Reports having been sent in, complaining of the present axle-arms, and would therefore enquire whether any reports have been received at Artillery Head Quarters, on which the change can be supported.

Remarks of the Brigadier Commandant of Artillery on Article 781.—The Artillery Select Committee in their "Opinion" record the impossibility on the *present occasion* to go into the consideration of the whole subject of com-

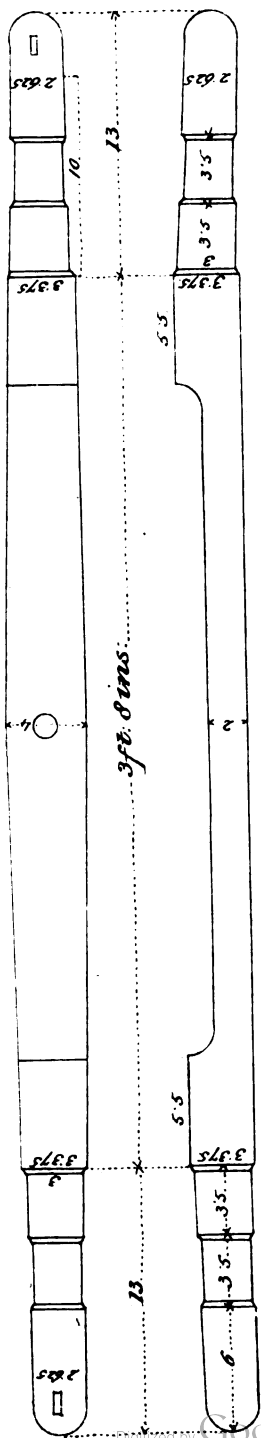
Artillery Select Committee

Plate 115.

Meeting 198, Article 781.

Page 658.

*Proposed Axletree, the lowerline being in
prolongation of the lower surface of the Axletree.*



Scale 1 1/2 Inch to a Ft.

parison between the Madras and Royal Artillery Carriages in detail, but I can no where discover their having stated their conviction of the inutility of their doing so hereafter.— I have further ascertained their intention of completing their report as soon as practicable. The two subjects prominently brought forward by the Superintendent Gun Carriage Manufactory they have taken up in detail, and I concur with their opinion in both. Dovetailing the Cheeks to the Beam has often resulted in cracks and is not so strong as tabling.

The existing Axle-arms need not be altered, and the proposed change in future construction will in no manner interfere with present Equipments.—The same wheels will all fit equally well in both cases. It is merely a question involving friction, the downward slope of the proposed axle considerably diminishing the same and therefore recommended.

Remarks by His Excellency the Commander-in-Chief on Article 781.—His Excellency quite agrees with the Brigadier Commandant of Artillery.

Orders of Government on Article 781.—Further report is awaited.

ARTICLE 782.

ON THE COMBINED USE OF THE “ DRAG SHOE ” AND “ LOCKING CHAIN.”

(a.) No. 10-853
22d March 1858. The Inspector General of Ordnance and Magazines forwards^(a) a letter from the Superintendent of the Gun Carriage Manufactory^(b) proposing that Drag Shoes and Locking Chains be used combinedly with the Madras Carriages as adopted in the Royal Artillery, and requests the decision of the Select Committee being obtained.

The undermentioned correspondence on the subject is also laid before the Committee.

(c) No. 469.
21st October 1857. *Letter^(c) from the Commandant of Artillery to the Inspector General of Ordnance and Magazines.*—Reporting the injury done to the inner

edge of one of the felloes of an 8 Inch Iron Howitzer Carriage, while being brought down from the top of the Mount, with one wheel locked; the strain on the locking chain being so severe that a link of the $\frac{1}{2}$ inch chain snapped, and the risk of a serious accident only averted by the strenuous use of the Drag ropes; which, as a precaution had been attached and manned.—Forwards copy of a letter from Major Cotter, on the same subject, representing the injurious effects to the Tires and Spokes of his wheels from the same cause, on his recent march from Mhow to Bombay.—Notices the proposal in 1839, of a Drag Shoe for “Light Field Carriages and Waggon,” by Brigadier Burton Commandant of Artillery, and approved, which after being modified and improved, seems to have been in use until the receipt of the Special Board Carriages and Equipments, in which “Chains Locking” were retained, and Shoes thenceforward fell into disuse.—Refers to a passage in the “Hand Book for Field Service,”

Page 62, 2d Para. from the top.
 “Use the Shoe on all occasions, shoeing the wheel on the side from the Precipice.”
 “If obliged to use a drag chain without a shoe, select a felloe where there is no joint.”

printed at the Royal Institution Woolwich 1857, by which it would appear that “Drag Shoes” are in use

in the Royal Artillery.—Strongly recommends the restoration of the “Drag Shoe” in substitution for “Locking Chains,” for the following substantial reasons.

1st. “That Experiment has proved its efficiency for the required purposes,—which its general use with Stage Coaches, and Waggon at home, fully confirms.

“2d. That the desired object is obtained by its use, without injurious friction of the Tires, or damage of the spokes or felloes.

“3d. That the strain on the chain is not nearly as severe as with the locking chain,—and therefore no risk of accidents from its use.”

That the subject, as regards Light Field Carriages &c. having already been amply considered and tested under the

recommendations of the Select Committee, and approved fully, it may probably appear unnecessary again to bring it before that body; and all that will be necessary, in such case, will be an order to adopt it, and for the same to be substituted at once for the Locking chains.

Recommends the use of the "Drag Shoe" for Heavy Field Carriages being submitted for the consideration of the Artillery Select Committee—"Its constant use with the heaviest "Carrier Waggon with broad wheels at home, seems to indicate its proper applicability to the purpose of our Heavy "Field Carriages, the necessity for which is clear."

(d) No 5431
26th October 1857. *Letter^(d) from the Inspector General of Ordnance and Magazines to the Commandant of Artillery.*--Acknowledging receipt of preceeding letter, suggesting the reintroduction of a Shoe instead of a locking chain, and states that he thinks the Shoe far preferable to a chain which must strain the wheels—That, "the introduction "of a Shoe must have been with the sanction of the votes of "the Board, Commandant of Artillery and Select Committee, "and if the shoe was discontinued by any omission in obtaining the assent of these three authorities, I consider the "abolition to have been made without due authority, and "necessarily it may be taken up."

(e) No. 497.
31st October 1857. *3. Letter^(e) from the Commandant of Artillery to the Inspector General of Ordnance and Magazines.*—States that the "Drag Shoe" was introduced with the sanction of the votes of the Military Board, Commandant of Artillery and Artillery Select Committee; and no fault found with it in practice;—Was after some years dropped, and the "Locking Chain" substituted, solely because the latter was included, and the "Shoe" unnoticed in the List of Ordnance Stores and Equipments submitted for the Artillery Select Committee's report, in Military Board's letter No. 4892, dated 23d December 1845.

[5] No. 84.
11th March 1858.

4. *Letter*^[5] *from the Commandant of Artillery to the Inspector General of Ordnance and Magazines.*—Bringing to notice, with reference to certain correspondence that no order has since authorized the restoration of the “Drag Shoe,” which was never ordered to be discontinued, and consequently the “Locking Chain” continues to be supplied;—That it seems very desirable, this equipment should be substituted for the objectionable “Locking Chain,” as early as practicable.

OPINION.—The Committee are of opinion that the superiority of the Drag Shoe over the Locking Chain is indisputable, and observe that they are not aware of the existence of any official authority for the discontinuance of the former, which was recommended by the Committee in Meeting 114,

* Artillery Records
Page. 219.

Article 318, dated 28th December 1840*; they strongly advocate its use and recommend that every Gun Carriage, Waggon and Cart in a Battery be equipped with one of the latest ordered pattern.

Observations of the Inspector General of Ordnance on Article 782.—There is no reason for discontinuing the Drag Shoe, but its merits should more frequently be tested by Batteries of Artillery at ordinary drills, passing over ground and using it.

Orders of Government on Article 782.—The use of the Drag Shoe is to be resumed as recommended.

ARTICLE 783.

ON THE FAILURE AT PROOF OF AN 8 INCH IRON HOWITZER CARRIAGE, ALTERED FROM A 10 INCH.

[a] No. 11415
10th April 1858.

The Inspector General of Ordnance and Magazines directs^[a] that the observations of the Superintendent of the Gun Carriage Manufactory on the failure of this Carriage, be submitted to the Artillery Select Committee, together with the portions of broken iron therein alluded to.

The undermentioned documents are laid before the Committee.

[b] No. 248
9th April 1858

1. *Letter^[b] from the Superintendent of the Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines*, of which the following is an extract.

“ I beg to draw your attention to the following portion of the Remarks contained in the Report*.—“ ‘ The quality of the iron exhibits a highly crystalline appearance over some portions of the surface, instead of the fibrous structure on which depends the toughness of malleable or wrought Iron.’ This remark no doubt intended to imply that the material of which the cheeks were made was bad or inferior.—“ That the mere crystalline appearance on some portions of the surface is not a sufficient proof of the badness of the quality of the Iron is evident from the accompanying pieces of Iron broken from different parts of the Axletree of the old Royal Pattern Carriage which was ordered to be broken up, and which I forward for your inspection; and should you think proper, that they may be laid before the Artillery Select Committee at their next Meeting.”

“ You will observe that the fractures of all these pieces very plainly indicate the same appearance which the Com-mandant brings forward as a cause of complaint; But though this iron is highly crystalline in appearance yet it has stood its work without failure, and on testing the same in the fire it proves most excellent iron for toughness.—Therefore the cause of failure of this Carriage must be looked for elsewhere than in the crystalline appearance of its surface, especially as it has stood the proof of the heavier calibre 10 inch Howitzer formerly, without injury, and it is surprising that it should now break down with the 8 Inch Howitzer as nothing was done to the Carriage to reduce its strength.”

• Proof Report.

[c] dated
26th March 1858.

2. *Proof Report^[c] of an 8 Inch Iron
Howitzer Carriage altered from a 10 Inch.*

OPINION.—The Committee concur in the opinion expressed by the Commandant of Artillery in the Proof Report as follows:—

“ Both cheeks of Carriage No. 12, broke at the 9th round
“ in rear of the trunnion boxes (as shewn in the accompanying
“ sketch*).—The welding of the right cheek is very imper-
“ fect,—two large flaws appearing at the fractured part, and
“ the plates of iron not welded.—The quality of the iron ex-
“ hibits a highly crystalline appearance over some portion of
“ the surface, instead of the fibrous structure on which de-
“ pends the toughness of malleable or wrought iron. This
“ carriage altered from a 10 Inch, underwent proof in its
“ original form, and may have suffered injury in the process
“ of alteration.”

Observations of the Inspector General of Ordnance on Article No. 783.—The Inspector General of Ordnance observes that defective welding and inferior iron appear to be the two causes for failure; both are points deserving attention at the Gun Carriage Manufactory.

Orders of Government on Article 783.—The attention of the Superintendent Gun Carriage Manufactory to be directed to this subject.

• ARTICLE. 784.

ON ALTERATIONS IN ELEPHANT HARNESS, PROPOSED BY
CONDUCTOR W. CLARKE OF THE NAGPORE ARSENAL.—
PLATE 117.

The Inspector General of Ordnance and Magazines for-
wards^[a] for submission to the Select Com-
mittee, a model of certain alterations made
in Elephant Harness by Conductor Clarke, together with
the undermentioned documents on the subject thereof.

[a.] No. 11357,
10th April 1858.

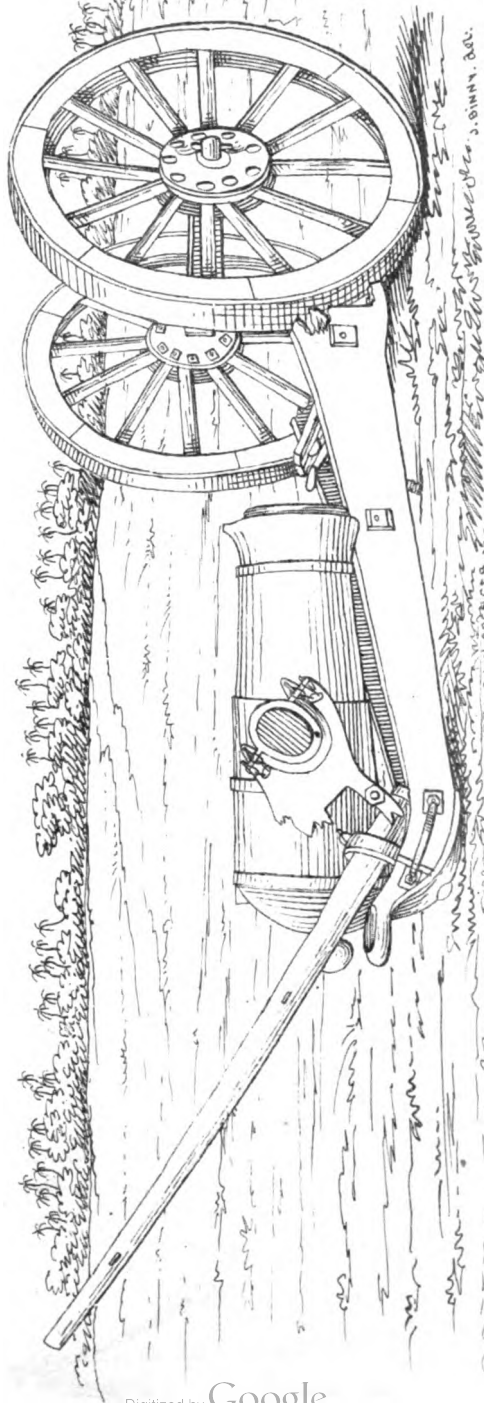
Artillery Select Committee.

Plate 116.

Page 664.

Meeting 198, Article 183.

Sketch of an 8 Inch Iron Howitzer Carriage (altered from a 10 Inch) which broke down at Proof on the 26th March 1858, at the 9th Round; 5 at Point Blank and 4 at 60.



ee.

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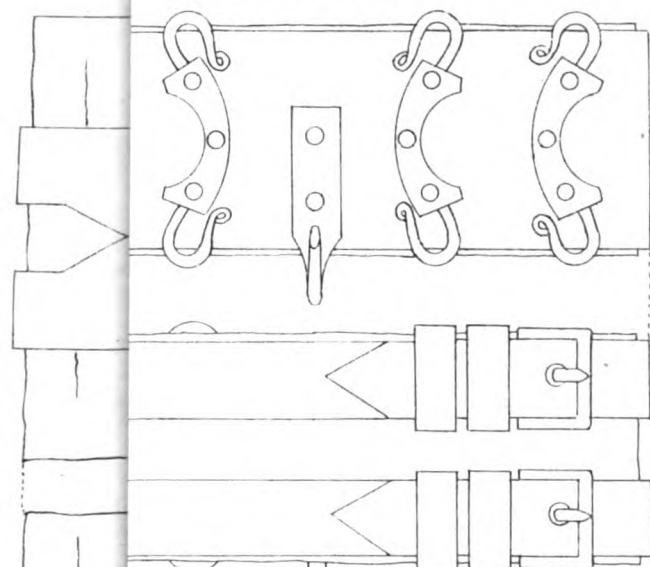
Plate 117.

Harness,

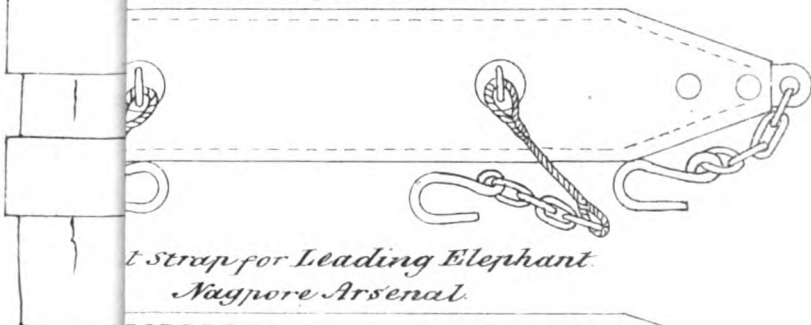
Nagpore Arsenal.

Strap for Leading Elephant

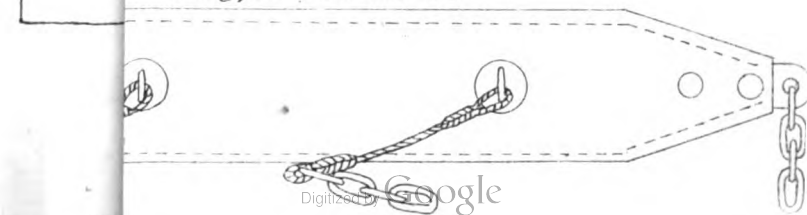
Nagpore Arsenal.



Strap for Leading Elephant
Secunderabad Arsenal.



Strap for Leading Elephant
Nagpore Arsenal.



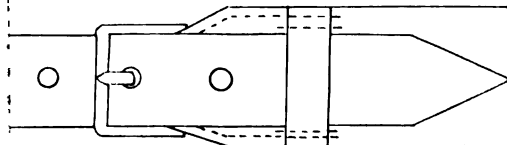
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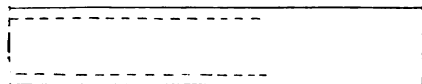
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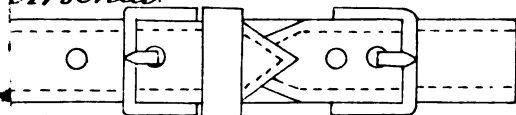
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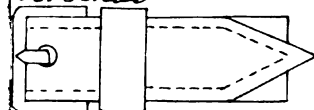
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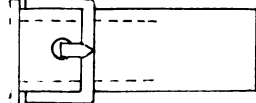
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Arsenal.



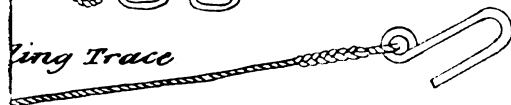
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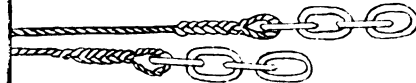
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ling Trace



ore Arsenal.



(b.) No. 534,
12th March 1858.

1. *Letter^(b) from the Acting Commissary of Ordnance Nagpore Force to the Principal Commissary of Ordnance Fort Saint George.*—Forwarding model of Elephant harness as improved in the Nagpore Arsenal, and states that, “ the advantages of the hooks “ over the eyes, so as at once to lengthen or shorten the “ the chains for a large or a small Elephant will be at once “ observable.”

Alterations in Elephant Harness.

1. Leading Trace 22 feet rope, manilla, chain iron 36 ins.
2. Pole Trace 6 feet 6 inches ,, ,, ,, 18 ,,
3. Pieces of Manilla rope 22 inches ,, ,, 12 ,,
4. Back Band, one plate on each side upper to receive the chain of the Breast strap and the branch of leading trace; this branch has 12 inches of chain attached.
5. A plate lower down on the leading Elephant's saddle similar to the above, to receive the manilla rope and chain attached to breast strap and the end of leading trace.
6. 2 Tugs with buckles $2\frac{3}{4}$ inch to receive the back band; each tug has 2 buckles, one for the back band and the other to shorten or otherwise; those should be 40 inches.—2 Tugs without buckles run over the Shafts 3 feet long, and fastened to a belly band of 4 feet 8 inches long with 2 buckles.

(c.) No. 1259,
6th April 1859.

2.—*Letter^(c) from the Acting Principal Commissary of Ordnance, to the Inspector General of Ordnance.*—Acknowledges receipt of the Models and pronounces the alterations as decided improvements, as according to the Nagpore model, the Harness can be made to fit any Elephant, whereas before it was neither capable of being “ taken in” or “ let out.”

OPINION.—The Committee are of opinion that the proposed alterations are a decided improvement upon the Old Elephant Harness, and recommend their adoption accordingly.

Observations of the Inspector General of Ordnance on Article 784.—The VIIth number of the Index to the Proceedings of the Bengal Permanent Artillery Select Committee, contains a Drawing, Plate 6, of a Saddle for an Elephant, and the Select Committee might examine the drawing as to any further change in the Madras Pattern; in the mean time, the Elephant Harness as now approved of, can be brought into use at Secunderabad, and thereby tested; the drawing of the Bengal Saddle might also be sent to these two Stations for report.

Orders of Government on Article 784.—Elephant Harness as approved of to be supplied—subject to such improvement as further experience may suggest.

ARTICLE 785.

ON A METHOD OF KEYING DOWN THE TRAVERSING HAND-
SPIKE OF LIGHT FIELD CARRIAGES, PROPOSED BY MAJOR
J. MAITLAND, MADRAS ARTILLERY—PLATE 118.

[a] No. 265.
14th April 1858.
No. 278.
17th April 1858.

Two letters^[a] from Major J. Maitland Superintendent of the Gun Carriage Manufactory, and also a trail plate with handspike attached, shewing the proposed method of keying it down, are laid before the Committee by order of the Brigadier Commandant of Artillery, for their opinion.

OPINION.—The Committee recommend that the proposed handspike be fitted to a Carriage at the Gun Carriage Manufactory, and then handed over to the nearest Field Battery for trial and report.

Observations of the Inspector General of Ordnance on Article 785.—1 The letter on which this proposed alteration is based should have accompanied the proceedings of the Select Committee.—

2. The Inspector General has no recollection of any reports being sent in from Batteries complaining of the Traversing handspike, as at present used, and would therefore

Artillery Select Committee.

Plate 18.

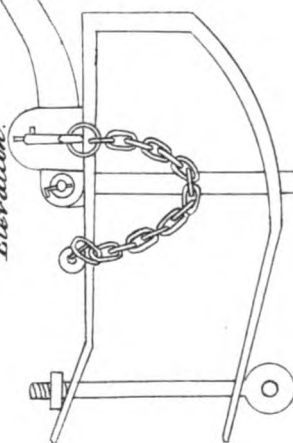
Page 666

Meeting 198, Article 185.

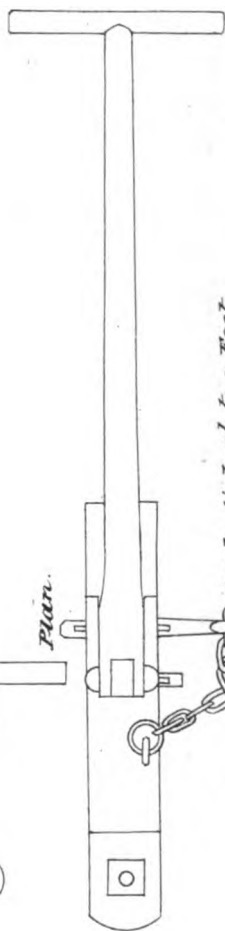
Method of Keying down the Traversing Handspike
of Light Field Carriages.--

Major Maitland
Madras Artillery.

Elevation.



Plan.



Scale. 1½ Inch to a Foot.

1 foot.

F.B.

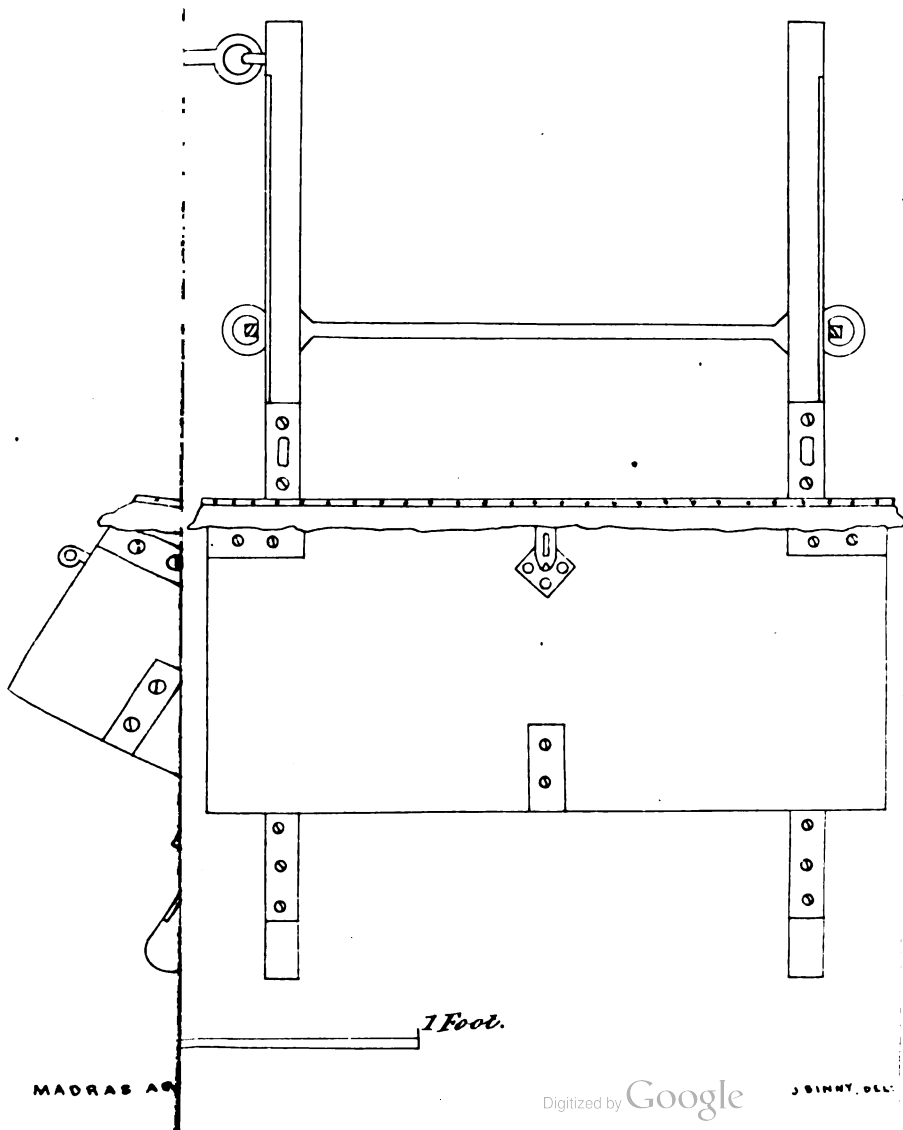
mittee.

186.

Plate 119.

ets,

ricer Foreman



request that the Records at Artillery Head Quarters be examined, and the grounds for proposing the alteration stated.

Remarks of the Brigadier Commandant of Artillery on Article 785.—When complying with the Inspector General's requisition contained in Para. 1, of his observations on this Article, I made the following remark in my letter which accompanied the documents asked for :—

“The tongue of the Light Field Iron Handspike has frequently been found defective, an instance of which was brought to notice in the remarks appended to my proof Report of Light Field Carriages submitted to you under date the 22nd March last.”

I agree with the Artillery Select Committee that the proposed handspike should have a fair trial.

Orders of Government on Article 785.—The proposed Handspike to be tried as recommended.

ARTICLE 786.

ON A PACK SADDLE FOR ROCKETS, PROPOSED BY ORDNANCE ARTIFICER FOREMAN T. HALL.—PLATE 119.

The Inspector General of Ordnance and Magazines forwards^(a) a drawing of a Pack Saddle for Rockets, together with the undermentioned correspondence relative to its manufacture, by Foreman T. Hall, and requests the same may be laid before the Select Committee for their opinion on the desirableness of the introduction of such an equipment into this Presidency.

[a] No. 11565,
15th April 1856.

[b] No. 903
11th Decr. 1857.

1.—*Letter^(b) from the Deputy Commissary of Ordnance Moulmein, to the Inspector General of Ordnance and Magazines Madras.*

(e) No. 765.
19th October 1857. 2. Letter^(c) from the Deputy Commissary of Ordnance Moulmein, to the Commissary of Ordnance Fort William.

[d] No. 6249,
18th February 1858. 3. Letter^(d) from the Commissary of Ordnance Fort William to the Deputy Commissary of Ordnance Moulmein.

(e) No. 134,
8th March 1858. 4. Letter^(e) from the Deputy Commissary of Ordnance Moulmein, to the Inspector General of Ordnance and Magazines Madras.

OPINION.—The Committee observe that the use of Rockets having been officially discontinued in this Presidency,* they regret that they have no opportunity of acquiring experience in this branch of the Artillery Service, and are therefore not in a position to offer competent opinion on the best nature of Rocket Equipment.

* Extract Minutes of Consultation,
No. 797, 10th March 1857.

Observations of the Inspector General of Ordnance on Article 786.—The use of Rockets in this Presidency having been ordered to be discontinued, there is no great necessity for having any other equipments than those in use with the Royal Artillery; but, adverting to the remark of the Select Committee about having the means of carrying on Practice with Rockets, the Inspector General submits that, so long as Rockets form a part of the Royal Artillery system, it is advisable to keep up a knowledge of the use of the weapon, but if to be used in India, a manufactory of Rockets is essential for securing efficient Rockets.

Remarks by the Brigadier Commandant of Artillery on Article 786.—I quite concur with the Inspector General; unless it be finally determined that the use of Rockets shall altogether cease, I consider it alike disadvantageous to the Service, and unfair to Officers and men, that they should be debarred practice in Garrison with a weapon they are liable

Artillery Select Committee.

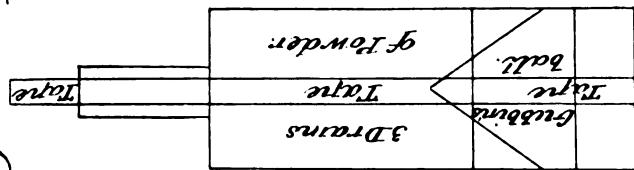
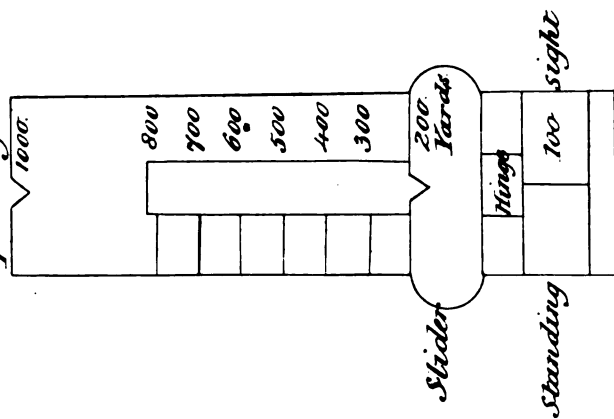
Page. 669

Plate. 120.

Meeting 198, Article 787.

Rifle Cartridges and Sight for the Brunswick Rifle, proposed by Captain F. Young of the Madras Rifles.— Cartridge "a l'Enfield."

Rifle Sight.



to be called upon to use in the Field.—The English Rocket, however, proves untrustworthy after being a very short time in this country, and they ought to be made in India.

ARTICLE 787.

ON RIFLE CARTRIDGES AND A SIGHT FOR THE BRUNSWICK RIFLE, PROPOSED BY CAPTAIN F. YOUNG OF THE MADRAS RIFLES.—PLATE 120.

The undermentioned documents are laid before the Committee.

- [a] dated
17th March 1856.
1. *Letter [a] from Captain F. Young Madras Rifles, to the Adjutant General of the Army.*

I have the honor to report that I have despatched to your address, by this day's Banghy, a small parcel, containing a packet of Cartridges and a sight which I have had made for the Brunswick rifle, sighted up to one thousand yards.

With referennce to the Cartridges I beg to state that the following are the improvements, and which I trust will meet with approval.—Hitherto we have had a *separate* Cartridge and ball to load with, and which caused a great delay in loading, but by having the Cartridge made “a l' Enfield,” this is done away with. The ball is put up *with the patch on*, for after repeated trials, I found the patch infinitely preferable to greased paper, and *for other obvious reasons*. My Cartridge is merely broken at top, the powder put into the barrel, and by tearing down the piece of tape the Gubbins' ball is bored with the patch on, and ready to hand for loading, instead of as formerly having it separate from the Cartridge.

The sight: is the present rifle standing sight filed down, and a long sight with a slider substituted for the folding down

owe, and by which our rifles carry as I have already stated up to 1000 yards.—The sight I submitted on the 15th ultimo to the Officer Commanding Madras Rifles, and he promised to forward it with his approval to the Inspector General of Ordnance, and with a Cartridge such as I have had manufactured, I confidently assert that the efficiency of the Madras Rifles will be very considerably increased, for with the old sight 400 yards was the greatest range.

[b] No. 640.
27th April 1858. 2. *Letter^[b] from the Adjutant General of the Army to the Brigadier Commandant of Artillery.*—Forwards, by order of the Commander-in-Chief copy of the preceeding letter and requests that the subject be referred to the Artillery Select Committee for report.

OPINION.—The Committee consider that Captain Young's cartridge seems to afford facility in loading as well as in carriage, but think the tape may be omitted as superfluous, and expensive in making up large quantities of Ammunition.—A sight similar to that proposed, was tried at the Artillery Depôt for many months with Brunswick Rifles, in the course of last year, and was found to answer the purpose perfectly.

Observations of the Inspector General of Ordnance on Article 787.—The Inspector General observes that this is a large question, involving many points of importance, the Cartridges as proposed by Captain Young can be made up and tested in Practice, but the difficulty will probably be found to arise after long storing in the Magazines.

A more useful sight than the one on the Rifle Musket pattern 1853 can hardly be devised, and if this pattern be taken and adapted for the Brunswick Rifle, then, with a thorough training, the soldier will find it efficient.

ARTICLE 788.

ON ELEVATING SCREWS IN PRESENT USE WITH LIGHT
FIELD GUNS.

[a] No. 759.
7th May 1859. The Adjutant General of the Army forwards^[a] the undermentioned correspondence for submission to the Select Committee by order of His Excellency the Commander-in-Chief, bringing to notice a defect in the Elevating Screws at present in use.

[b] No. 125.
16th April 1859. 1. *Letter^[b] from Major General Whitlock, Commanding Saugor Field Division to the Adjutant General of the Army Ootacamund.*—Forwards the following letter from Brigadier Miller, on the subject of Elevating Screws, and thinks some change is necessary to remedy the delay with which fire is opened.

[c] No. 46.
11th April 1859. 2. *Letter^[c] from Brigadier W. H. Miller, Commanding Artillery Saugor Field Division to the Assistant Adjutant General Saugor Field Division.*—In reporting the cause of delay in not opening fire after the Guns were in position, states, that it is attributable solely to the elevating screw at present in use running down, both when a gun is in motion and when fired, consequently some time is lost, ere it can be brought to such a level as admits of its being spunged. Has long been of opinion that the loose capstan headed elevating screw is a great mistake, and would be very glad to see it done away with, and the old fixed screw restored.

OPINION.—The Committee observe that the question of fixed or loose capstan headed Elevating screws has formed the subject of repeated and through investigation and discussion by the Special Board of Artillery Officers at Calcutta, and by the Madras Artillery Select Committee, and the present pattern adopted as the result, for the preference of which, important and valid reasons, affecting the stability

of the Carriages exist.—The one single objection upon which Brigadier Miller proposes to relinquish several advantages and revert to a pattern deliberately superseded, may be obviated with the utmost facility, by the simple application of a loop of leather, or rope, to the cascable, which passed over one of the capstan handles effectually prevents the running down of the screw, and is removed for use in a second; the Committee therefore would deprecate any alteration in this improved arrangement.

Observations of the Inspector General of Ordnance on Article 788.—The Inspector General has not seen the papers on which this Report is based, and can offer no opinion as to the merits of the question; but, considering that Brigadier Miller, Commanding the Artillery in the Field, an old and experienced Artillery Officer, and General Whitlock Commanding a Division in the Field have, after an action with the enemy, reported a defect in the Elevating screw, it appears advisable to enter more fully into the question than the Committee have done in this Report; But when the papers are before the Inspector General, further observations will be submitted.

Remarks of the Brigadier Commandant of Artillery on Article 788.—I cannot concur in the opinion the Select Committee have given on the question of fixed or loose capstan headed elevating screws, nor can I see the force of their arguments for giving the preference to the latter, or admit that we have derived the advantages that were expected by the Select Committee in 1846*. “That the

* Article 419.

“frequent recurrence of injury to carriages would be avoided by reverting to the capstan headed elevating screws,” as it appears to me that more of our Carriages have broken down during the last few years than at any former period.

The evil of which Brigadier Miller complains of the Guns running down and the difficulty and delay in getting them

up again, have been experienced by almost every Artillery Officer, while the different modes that from time to time have been suggested to rectify the evil, do not appear to have answered the end proposed.

Brigadier Miller brought this subject under my notice when he was with me at Secunderabad, it is therefore no new theory with him, and experience on service has only confirmed the views he had previously entertained.

The Bengal Artillery still retain the elevating screw attached to the cascable, although in the Proceedings of the Special Board of Artillery Officers that assembled in Fort William 19th March 1838, it was resolved that a change should be made, but experience during the hard work they have had since that period, has probably proved to them that the fixed elevating screw is the better arrangement of the two, and when we bear in mind that the Royal Artillery also adopt that plan, I think that two such high authorities should have full weight with us, and that it would not be prudent to place ourselves in opposition to them, except on the clearest and most indisputable evidence of the superiority of our own system.

[d] No. 289, *Extract from letter^(d) from the Brigadier*
12th August 1850. *Commandant of Artillery to the Adjutant*
General of the Army.—"I have the honor to request your
"attention to my remark on Article 788 (Elevating screws)
"in the 4th Para. of which I stated that 'the Bengal Artillery
" 'still retain the Elevating screw attached to the cascable,'
"meaning that the whole of their light field Ordnance were
"so constructed.

"2. By Proceedings of the Bengal Artillery Select Com-
"mittee since received, I have discovered that the 9-Pounder
"and 6 Pounder Guns in Bengal have the fixed Elevating
"Screw, but that all the Howitzers of Light Field Batteries
"have the Capstan Head Elevating Screw similar to our own.

"I consider it therefore my duty to bring this discrepancy to His Excellency's notice, and beg that this explanation may be attached to the Proceedings."

Orders of Government on Article 788.—This question to be referred to the Select Committee for further consideration, in connection with the remarks of the Commandant of Artillery.

MEETING 199.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL P. HAMOND, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depôt, Saint Thomas' Mount, 7th September 1858.

PRESENT.

COLONEL J. W. CROGGAN, *Commanding 5th Battalion Artillery.*
 MAJOR G. W. Y. SIMPSON, *Acting Principal Commissary of Ordnance.*
 MAJOR G. BRIGGS, *Acting Director Artillery Depot.*
 MAJOR J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 MAJOR G. ROWLANDSON, *Acting Superintendent Gun Powder Manufactory.*
 MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*
 LIEUTENANT R. MORTON, *1st Battalion Artillery.*

ARTICLE 789.

ON THE DIFFERENCES IN CONSTRUCTION BETWEEN THE CARRIAGES AND PATTERNS OF STORES OF THE ROYAL AND MADRAS ARTILLERIES, IN CONTINUATION OF MEETING 198, ARTICLE 781, OF 26TH MAY 1858.

The documents laid before the Committee at their former Meeting on this subject, are again laid before them.

OPINION.—One of each description of Light Field Carriages of the Royal and Madras Services being present, the Committee proceed to compare them, taking each several part in detail as recorded in the Comparative Statement forwarded by the Superintendent of the Gun Carriage Manufactory, and append their observations as follows :—

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.																																																									
<p>CARRIAGE 6-POUNDER GUN.</p> <p>THE TRAIL is composed of a solid, or two half Beams which are tabled and bolted together. It has no hump at the Elevating Screw. 5 Bolts pass through it horizontally when solid and 6 when of two pieces; 8 bolts pass through it vertically.</p> <table border="1"> <thead> <tr> <th></th><th>Feet.</th><th>Inches.</th></tr> </thead> <tbody> <tr><td>Length of Beam.....</td><td>8</td><td>9-25</td></tr> <tr><td>Breadth at Breast.....</td><td></td><td>8-2</td></tr> <tr><td>" " Elevating Screw.....</td><td></td><td>8-2</td></tr> <tr><td>" " Trail.....</td><td></td><td>6</td></tr> <tr><td>Depth at Breast.....</td><td></td><td>7-25</td></tr> <tr><td>" " Elevating Screw.....</td><td></td><td>8</td></tr> <tr><td>" " Trail.....</td><td></td><td>5-8</td></tr> </tbody> </table>		Feet.	Inches.	Length of Beam.....	8	9-25	Breadth at Breast.....		8-2	" " Elevating Screw.....		8-2	" " Trail.....		6	Depth at Breast.....		7-25	" " Elevating Screw.....		8	" " Trail.....		5-8	<p>CARRIAGE 6-POUNDER GUN.</p> <p>THE TRAIL is composed of a solid Beam or two half Beams bolted together and has a hump at the Elevating Screw. 5 bolts pass through the Beam horizontally when solid, and 8 when made of two pieces, 9 bolts pass through it vertically. The holeway from firing. The extra horizontal pieces (when the trail is made of two bolts) may be required by the difference of construction, the half beams being merely bolted in the Royal Artillery, instead of tabled also, as in the Madras Artillery Carriage.</p> <table border="1"> <thead> <tr> <th></th><th>Feet.</th><th>Inches.</th></tr> </thead> <tbody> <tr><td>Length of Beam.....</td><td>8</td><td>9 (a)</td></tr> <tr><td>Breadth at Breast.....</td><td></td><td>9 (a)</td></tr> <tr><td>" " Elevating Screw.....</td><td></td><td>6</td></tr> <tr><td>" " Trail.....</td><td></td><td>8 1/2 (b)</td></tr> <tr><td>Depth at Breast.....</td><td></td><td>9 1/4</td></tr> <tr><td>" " Hump.....</td><td></td><td>6 1/2</td></tr> <tr><td>" " midway between the Head and Elevating Screw.....</td><td></td><td>6</td></tr> <tr><td>" " at Trail.....</td><td></td><td>6</td></tr> <tr><td>(a) 1 inch cut away for tabling.</td><td></td><td></td></tr> <tr><td>(b) 3 inches cut away as far as axle case.</td><td></td><td></td></tr> </tbody> </table>		Feet.	Inches.	Length of Beam.....	8	9 (a)	Breadth at Breast.....		9 (a)	" " Elevating Screw.....		6	" " Trail.....		8 1/2 (b)	Depth at Breast.....		9 1/4	" " Hump.....		6 1/2	" " midway between the Head and Elevating Screw.....		6	" " at Trail.....		6	(a) 1 inch cut away for tabling.			(b) 3 inches cut away as far as axle case.			<p>TRAIL.—The hump in the Royal Artillery Carriage gives additional strength in a part where it is much needed, and in our Carriages frequently gives the holeway from firing. The extra horizontal pieces (when the trail is made of two bolts) may be required by the difference of construction, the half beams being merely bolted in the Royal Artillery, instead of tabled also, as in the Madras Artillery Carriage.</p>
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MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
<p>AXLE CASE.—In housing the Axle Case into the Beam, the greater part of the wood is cut away in the Axle Case.</p> <p>Length..... 3 Feet. Inches. 8 Breadth..... 6 Thickness..... 6</p> <p>AXLEFREE. has one bolt passing through it—the axle arms are straight with a recess in their centre for grease.</p> <p>Length between the arms..... 3 Feet. Inches. 8 " of each arm..... 1 Breadth of Axle at the centre..... 4 " Arms..... 3½ Greater thickness of Axle..... 3½ Thickness in the centre..... 1½ Greater diameter of arm..... 3 Less " 2½</p>	<p>AXLE CASE.—In housing the Axle Case into the Beam, the greater part of the wood is cut away in the beam. The axle case tapers on the upper surface from the outside of the cheeks to the extremities.</p> <p>Length of upper surface..... 3 Feet. Inches. 9 " lower " 3 8 Breadth..... 6½ Thickness at centre..... 6 " ends..... 5½</p> <p>AXLEFREE. has three bolts passing through it, the axle arms are bent, the recess for grease is in the nave box instead of the axle arm.</p> <p>Length between the arms..... 3 Feet. Inches. 8 " of each arm..... 1 3½ Breadth of axle throughout..... 3 Greater thickness of axle..... 3½ Thickness in the centre..... 1½ Greater diameter of arm..... 2½ Less " 1½</p>	<p>AXLE CASE.—The Committee prefer the Madras method of housing the Axle Case into the beam to that of the Royal Artillery, the latter taking away from the depth and strength of the beam while the former cuts more away from the Axle Case, but there may be advantages on either side.</p> <p>AXLEFREE.—The present pattern axle arm in Madras is a right cone, the axis of which is horizontal. The Committee have recommended* re- * Meeting 198 verting to "Cullen's Patent" in which the axis of the cone is depressed sufficiently to bring the lower line of the axle arm in prolongation of the bottom of the axle body. The Royal Artillery axle arms are bent down at an angle of 25°, and this deflexure is met by an increased dish in the wheels. The Madras Artillery retain the grease in a recess made in the axle arm for the purpose; the Royal Artillery have the groove in the nave box; the latter might be adopted with advantage in addition to the former. The position of the bolts in the Royal pattern is the same as in the Bengal Carriage. The Committee is disposed to think that a</p>

modified axle might be introduced, combining the advantages of both without adopting those points of construction in either which appear open to objections.

TRUNNION AND GARNISH PLATES.—Four bolts pass through each cheek with screws to fasten the plates on.—The trunnion boxes are immediately over the centre of the axletree, and are half an inch in thickness.

TRUNNION AND GARNISH PLATES.—The difference in the mode of fastening these to the cheek consists in the Royal Artillery having several round headed nails in lieu of screws. The Committee think our own plan the better one, as causing fewer and less injurious perforations in the cheek, with less liability to become loosened by shocks of firing and travelling. There is also one extra bolt in the Royal Artillery Carriage passing through cheek and axletree which does not exist in any Indian Carriage, nor has its want ever been felt. The Royal Artillery trunnion boxes are thrown half a diameter in front of centre of axle, while those of Madras are directly over the centre of the axletree, which the Committee consider the best position for Light Field Guns for reasons connected with recoil, which they have already advanced (*vide Proceedings Meeting 176, Article 658.*)

ELEVATING SCREW AND BOX.—The box is bolted on the beam by 4 half inch bolts. The Elevating Screw is 15½ inches in length and 1½ inches thick, with a circular capstan head on which the base ring of the Gun rests, the handles of the Gun, the handles are fitted on to the box.

ELEVATING SCREW AND BOX.—The difference between the Royal and Madras Artillery was recorded in Meeting 198, Article 781, and the preference given to the detached Capstan head Elevating Screw, as in use with the latter.

The question of fixed and detached Elevating Screws was fully considered by

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
		<p>the Special Board of Artillery Officers of the three Presidencies which assembled in Calcutta in the year 1838, who although they at first established the elevating screw attached to the cascable as the pattern for <i>guns</i>, did, at a subsequent date, after mature deliberation and trial of the two modes, unanimously resolve (on account of the violent action and jumping of the trail and consequent distress to the carriage) that the screw should be unattached to the breech as in the howitzers. The subject was subsequently discussed by the Madras Artillery Select Committee in Meeting 136, Article 419, 2nd October 1846, and in all these instances the opinion was in favor of the present Madras pattern, which the Committee see no good reason for changing.</p> <p>N.B.—In a recent Proof of a 6-Pounder Gun of the Royal Horse Artillery on its own Carriage after bouching, the trail was observed to jump at least 8 inches from the ground. A trial was afterwards made on the same spot with a 6-Pounder Carriage of the Madras Established pattern with the same elevation, which was found to have a perfectly smooth and easy recoil, but the gun oscillated on its trunnions to the full extent possible, and the breech fell heavily on the elevating screw. An experiment has subsequently been</p>

made by lashing the breech of the gun to the trail of the Madras Carriage—the result was (as anticipated) a jump, but not so high as the Royal Artillery Carriage, this may be accounted for in some measure by the Royal Artillery trunnions being half a diameter more to the front than in ours.

PINTLE LOOP AND TRAIL PLATE.—The Pintle Loop is fixed to the Trail Plate and is not moveable, the Trail Plate is fastened to the beam by 4 bolts besides several nails.

Oval diameters of Pintle loop 2½ inches, 3 inches.
Thickness " " 1½ "

PINTLE LOOP AND TRAIL PLATE.—The Royal Artillery is a fixed loop. The Madras a swivel loop. The latter has (in the opinion of the Committee) so many advantages over the former, that they earnestly deprecate any change.

The swivel loop from its construction is obviously calculated to save the trail of the Gun Carriage, the pintle hook and whatever framing it may be attached to, besides the pole horses and driver, from severe strains and shocks in travelling over rough, rocky, or broken ground, each carriage feeling only the effects of its own particular collision with stones, ruts, &c., and being quite unaffected by that of the other. Moreover, should the Gun Carriage be upset, the limber will remain in its place (and vice versa), indeed it has frequently happened that a Gun Carriage has turned and righted itself again without the driver being aware of it, or the horses in the least disturbed. Had this capsize happened to a Gun Carriage with a fixed loop, it would have upset the limber, thrown down the pole horses, and a fatal result would very likely have followed.

PINTLE LOOP AND TRAIL PLATE.—The Pintle Loop turns on a swivel and is fixed to the centre of the end of Trail Plate, which is fastened to the beam by three bolts.

Oval diameters of Pintle loop 2½ inches, 3¼ inches.
Thickness " " 2 "

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
<p>HANDSPIKE,—is of iron, which is fixed to one of the trail plate bolts.</p>	<p>HANDSPIKE,—an iron loop is fixed to one of the trail plate bolts, and an iron hoop nailed on at bend of trail, intended for a wooden handspike.</p>	<p>HANDSPIKE.—The Royal Artillery use a large heavy wooden handspike (long since exploded from the Madras Artillery), which is taken in and out as circumstances require, and when limbered up is carried above the trail but inverted from the position it has when in action.</p> <p>The Madras Artillery iron handspike is a fixture, and the Committee prefer it on account of its light appearance and portableness.</p>
<p>CHEEK SIDE BOLTS, are three square headed bolts 1 inch thick, with square nuts and washers, the heads of the bolts and nuts are on the outer bolts and nuts are buried in flush with the surface of cheeks.</p>	<p>CHEEK SIDE BOLTS, are three round headed bolts 1 inch thick with circular nuts, the heads of the bolts and nuts are buried in flush with the outer surface of cheeks.</p>	<p>CHEEK SIDE BOLTS.—The Royal Artillery pattern being countersunk flush with the cheeks renders it necessary to cut away part of the wood to admit the heads, and requires a key specially to remove them. The Madras Artillery nuts are easily unscrewed with almost any tool, and are on this account considered preferable.</p>
<p>DRAG SHOE,—none,</p>	<p>DRAG SHOE, is a heavy iron shoe attached to the Locking Chain which is fixed to the eye bolt under the trail plate, the other end of the shoe in travelling is suspended to a hook in the axle case.</p>	<p>DRAG SHOE AND EYE BOLTS WITH CHAINS DRAG.—The Madras Artillery should unquestionably be provided with one to every Carriage, and of nearly the same pattern as that the Royal Artillery, as was recommended by the Select Committee in Meeting 108, Article 283, and introduced, but discontinued subsequently, because not in the Bengal Equipments, though no order was ever given for the change.</p>
<p>EYE BOLTS WITH CHAINS DRAG,—none.</p>	<p>EYE BOLTS WITH CHAINS DRAG.—Have 2 Chains fixed to eye bolts passing through the axle case similar to the roller chains in the Madras Heavy Field Carriages.</p>	

MINOR ARRANGEMENTS.—	MINOR ARRANGEMENTS.—	MINOR ARRANGEMENTS.—No particular remarks.
<p>10 Staples. 2 Hooks for suspending locking chain. 1 Hook for suspending bucket. 1 Portfire Socket on the left cheek.</p>	<p>12 Staples. 1 Hook for suspending the locking chain. 1 " " " drag shoe. 1 " " " line yard. 1 " " " drag chains. 1 " " " bucket. 2 Camp Kettle Plates with hooks on the axle case. 2 Portfire Sockets on the left cheek. 1 Worm hook on the under surface of beam. 2 Hooks for claw hammer on the left cheek. 2 Leather Straps for clinch hammer and pincers on right cheek. 1 ditto for sponge head on the under surface of beam. 1 ditto for vent prickers on right cheek.</p>	
<p>LIMBER.</p>	<p>LIMBER.</p>	<p>LIMBER.</p>
<p>POLE.</p> <p>Length of Pole..... 10</p> <p>Greatest breadth..... 4</p> <p>" thickness..... 4</p> <p>Diameter at the end..... 3</p> <p>Length from splinter bar to the end of pole..... 7</p>	<p>POLE, has no pole but a shaft which fits on the Limber in the same manner as the pole in the Madras Limber and has an off shaft similar to the Bengal Pattern.</p> <p>Length of Shaft..... 9</p> <p>Greatest breadth..... 7</p> <p>" thickness..... 4</p> <p>Thickness at the end..... 3 1/2</p> <p>Length from splinter bar to the end of shaft..... 6</p> <p>11 1/2</p>	<p>POLE OR SHAFTS.—Various experiments have been made to test the advantages of both these systems, (some of them by Members of the present Committee) and the reports of the Officers to whom the trials have been entrusted, go far to show that either has in some points superiority over the other.</p> <p>Some of the objections to the use of the shaft are:—</p> <p>1st. The difficulty of procuring horses sufficiently powerful for the work.</p> <p>2nd. The shaft horse has about 77 lbs. on his back, (without including the harness) and with that has the chief part of the work in all except straight forward draught, for the awkward onesided appli-</p>

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
		<p>cation of the near wheel's breeching, being attached to a fixed point (shaft) on the off side, and to his own collar on the near side, so draws his hind quarters inwards in descents and halting, as to prevent the application or exertion of his fair share of weight in checking the onward movement of the Carriage.</p> <p>3rd. The difficulty of disengaging a shaft horse in case of accident.</p> <p>4th. The great danger to the <i>whole machine</i> in case the near wheel horse falls.</p> <p>The advantages of the shaft are,—</p> <p>1st. More freedom of action to the wheel horses, especially to the shaft horses fore-hand in going over broken ground, and from the weight being placed so nearly on the centre of gravity, more power to the latter in recovering himself in case of a stumble or fall.</p> <p>2nd. The more equal distribution of weight on the two wheel horses.</p> <p>3rd. The removal of weight from the necks of both horses.</p> <p>4th. The adaptation for single file of horses in a narrow pass where there may not be foothold for a pair or for three horses abreast, in deep sand, or swampy ground.</p> <p>The "Pole" may be called the continental system being adopted in France, Austria, Prussia, Bavaria, Switzerland, Sweden, and Holland, in fact in all States</p>

where the horses are smaller than the powerful English horse, for this reason it is preferable for this country, but to apply this system with effect and to save the horses' necks from galling the lightest possible weight should be imposed upon them, a result only obtainable by a judicious application of a counterpoise which is so successfully effected by the short pole in rear of the Madras Limber. The question is however still an open one. The only two British Artilleries using the shaft are the Royal and Bombay.

AXLE CASE.—The Madras Limber has an axletree band which is not found in the Royal Artillery, but its use is also applied to the strengthening the short pole, and is so far the result of peculiar construction.

SHORT POLE OR CENTRE FRAME.—The points on which the Committee consider the position of their pinle loop superior to that of the Royal Artillery are:—
1st. That by this length of lever a counterpoise to the weight of the pole on the horses' necks is produced when the gun is attached, an arrangement which is indispensable to the efficient application of Pole draught and by which the weight at the pole is reduced to a minimum.

2nd. The process of limbering up is rendered more easy, and less liable to

AXLE CASE.—The axle case projects $3\frac{1}{2}$ inches over the body of the axletree on the upper surface, 6 bolts pass through the axle case, 2 through the axletree and 2 through each brace which secures them to the axle case.

	Feet.	Inches.
Length on the upper surface.....	4	2 $\frac{1}{2}$
" " under ".....	3	8
Breadth.....	5	$5\frac{1}{2}$
Depth.....	8	$8\frac{1}{2}$

SHORT POLE OR CENTRE FRAME.—Does not project in rear of axle case.

	Feet.	Inches.
Length.....	2	11
Greatest breadth.....	8	
Least ".....	4	
Thickness.....	2	$2\frac{1}{2}$

AXLE CASE.—5 bolts pass through the axle case, 1 through the short pole and 2 through each brace.

	Feet.	Inches.
Length.....	3	8
Breadth.....	6	
Depth.....	7	

SHORT POLE OR CENTRE FRAME.—Projects in rear of axle case 10 inches.

	Feet.	Inches.
Length.....	4	2
Breadth.....	6	
Greatest thickness.....	6	
Least ".....	3	

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
<p>BRACES projects in rear of axle case 8½ inches.</p> <p>Feet. Inches.</p> <p>Length..... 4 0½</p> <p>Greatest breadth..... 6 3½</p> <p>Least "..... 3½</p> <p>Thickness..... 2½</p> <p>SPLINTER BAR.—Has fixtures for a pole, the eyes on the splinter bar hoops are vertical.</p> <p>Feet. Inches.</p> <p>Length..... 5 9</p> <p>Breadth..... 3 3</p> <p>Thickness..... 3</p>	<p>BRACES project in rear of axle case 3½ inches.</p> <p>Feet. Inches.</p> <p>Length..... 3 5½</p> <p>Breadth..... 2½</p> <p>Thickness..... 2½</p> <p>SPLINTER BAR.—Has fixtures for shafting &c. similar to the Bengal Limber. The eyes on the splinter bar for the braces are horizontal.</p> <p>Feet. Inches.</p> <p>Length..... 6 0½</p> <p>Breadth..... 3½</p> <p>Thickness..... 4</p>	<p>accidents to the men, the limber boxes too are saved from the smashing blows which the Royal Artillery pattern receive in limbering up, which destroyed our boxes when we formerly used that construction on trial.</p> <p>BRACES.—No particular remarks.</p> <p>SPLINTER BAR.—It has been repeatedly found that the vertical eyes with the improved trace hook as in use in the Madras Artillery, give greater facility in releasing horses kicked over traces and lying upon them, the hooks flying off of themselves so soon as the ring is removed. Not so with the horizontal eyes, in which the hooks often get jammed, a dilemma wherein it is next to impossible to extricate them, the weight of the horse in the one case facilitates, in the other defies its release. It would be very desirable to have the sharp edges underneath the Splinter Bar rounded off, as horses legs are constantly very severely injured by kicking. This applies equally to the Royal and Madras Artillery Carriages.</p>

CROSS FRONT FRAMING.—Has none.		CROSS FRONT FRAMING.		No particular remarks.
LASHING BAR,		LASHING BAR.—Has none.		
Length.....	Feet. Inches. 3 ... 9½	Length.....	Feet. Inches. 4 ... 4	
Breadth.....	... 2	Breadth.....	... 3¾	
Thickness.....	... 2	Thickness.....	... 1½	
FOOT BOARD LARGE.		FOOT BOARD LARGE.		Ditto.
Length.....	Feet. Inches. 4 ... 3¾	Length.....	Feet. Inches. 4 ... 4	
Breadth.....	... 7½	Breadth.....	... 9	
Thickness.....	... 1¼	Thickness.....	... 1¼	
FOOT BOARD SMALL.		FOOT BOARD SMALL.		Ditto.
Length.....	Feet. Inches. 4 ... 2¾	Length.....	Feet. Inches. 8 ... 10½	
Breadth.....	... 6	Breadth.....	... 9	
Thickness.....	... 1½	Thickness.....	... 1¾	
AXLETREE—the same as the Carriage axletree, has one bolt passing through it.		AXLETREE—the same as the 6-Pounder Carriage Axletree, has two bolts passing through it.		Ditto.
PINTLE Hook, has a long plate attached to it, which is buried in the short pole and secured by 3 bolts passing through it vertically.		PINTLE Hook, has a small plate similar to the Bengal pattern which is bolted on to the rear of axle case by 3 bolts passing through it horizontally.		
AXLETREE CASE CENTRE BAND, secured by the same 3 bolts which secure the Pintle hook plate, has a hole in it to receive the stud at the end of the pole.		AXLETREE CASE CENTRE BAND.—Has none. The stud at the end of pole is fixed in the axle case.		Ditto.
		AXLETREE CASE CENTRE BAND.—The Committee think the Madras system the better of the two, as giving additional support to the axletree, and uniting it more firmly to the body of the Carriage.		Ditto.

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
<p>SPLINTER BAR STAYS.—$\frac{1}{4}$ inch thick, has a loop at one end of it which goes on the splinter bar, and is bolted through.</p>	<p>SPLINTER BAR STAYS.—$\frac{1}{2}$ inch thick has no hoop, but a plate which is bolted to the splinter bar.</p>	<p>SPLINTER BAR STAYS.—The Madras pattern unquestionably gives a greater support to the splinter bar, and is therefore considered better than that of the Royal Artillery.</p>
<p>AMMUNITION BOXES.—Each Limber carries two boxes, and each box has two circular handles, the inner one of which may be turned down, when placed on the Limber, the boxes have leather cushions placed on them.</p>	<p>AMMUNITION BOXES.—The dimensions of the box, as well as the interior fittings differ from that of the Madras ammunition box. Each limber carries two boxes, and each box has a large rectangular handle on the outer side, and two box handles one in front and the other in rear. No cushions are placed on the box. The two sides of the box are made of elm—all the parts of deal.</p>	<p>AMMUNITION BOXES.—The circular handles on the Madras Artillery limber boxes, have been found ample for the limber men to hold on by. The inner handles should be made so as to be capable of turning down, which is necessary to allow a disabled carriage to be conveniently placed on the top of the boxes, whilst the power of elevating them so as to correspond with the outer handles gives a great advantage in the facility with which the boxes can be carried by hand when so required, by simply passing a common bamboo or pole through the handles. The parts constructed of deal in the Royal Artillery boxes, are found to be unfit to stand the climate. The fittings for projectiles of the latter are however superior to those of our own Artillery. The shot and shell are carried much more compactly, each being kept separate from the other so that any description of ammunition is readily found, and the liability to friction is less, whilst the interior of the boxes being unaffected by any diminution in their numbers, there is no rolling about of shot or shell;—whereas in the Madras boxes the spherical case shot only</p>
<p>Inches. Interior length of box..... 20 " breadth 17 " depth 14$\frac{1}{2}$ Thickness of top and front board..... 1 " " bottom sides and rear board. $\frac{3}{4}$</p>	<p>Inches. Interior length of box..... 18$\frac{1}{2}$ " breadth 14$\frac{1}{2}$ " depth 15$\frac{1}{2}$ Thickness of top board..... 1$\frac{1}{2}$ " " sides and bottom 1</p>	

is in partitions, the round shot and canister are put in loose, and the interstices stuffed with oakum, in consequence of which it is not always easy to find the sort of ammunition required, after a portion of the shot has been removed the remainder having no support but the oakum, roll about in movement to the manifest injury of the boxes.

The Madras Artillery carry their cartridges in copper boxes, and take them out one by one as required. The Royal Artillery keep their cartridges in a painted canvas bag which being over a portion of the shot has to be removed to get at those which are underneath. The Committee consider their own copper box system very preferable.

BOX FOR SMALL STORES.—Is placed on the axle
limber in front of the ammunition boxes, between
the lashing bar and foot board.

Inches.	
Interior length of box.....	36
" breadth	8
" depth	7
Thickness of boards.....	

BOX FOR SMALL STORES.—From the

very much greater number of small stores necessarily carried by the Madras Artillery with their present equipment, the small store box is considerably larger than that of the Royal Artillery; with the introduction of improved projectiles, and Boxer's fuze, many of these will become superfluous and the box capable of considerable reduction, and perhaps may then be placed in the same position as in the Royal service, which amongst other advantages will be less inconvenient for the men's legs when seated on the limber, and diminish weight at the end of the pole. The Royal Artillery, however, carry nearly all their small stores in the limber boxes, at the top of the ammunition, in leather holdalls and canvas bags,

BOX FOR SMALL STORES.—Is placed on the axle
case between the limber boxes.

Inches.	
Interior length of box.....	10
" breadth	4
" depth	4
Thickness of boards.....	

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
CARRIAGE 12-POUNDER HOWITZER.		
<p>BEAM.—Composed of a solid or two half beams, tabled and bolted together, has a hump at the elevating screw, 4 bolts pass through it horizontally when made of solid and 5 when made of two pieces—10 bolts pass through it vertically.</p> <p>Feet. Inches.</p> <p>Length of Beam..... 8 ... 10</p> <p>Breadth at Breast..... 10-2</p> <p>" " Elevating Screw..... 10-2</p> <p>" " Trail..... 6-25</p> <p>Depth at Breast..... 8-25</p> <p>" Hump..... 11-25</p> <p>" Trail..... 5-8</p>	<p>CARRIAGE 12-POUNDER HOWITZER.</p> <p>BEAM.—Composed of two half beams bolted together, has a very slight hump at the elevating screw.—8 bolts pass through it horizontally, and 10 vertically.</p> <p>Feet. Inches.</p> <p>Length of Beam..... 9 ... 0</p> <p>Breadth at Breast..... 10</p> <p>" " Elevating Screw..... 10</p> <p>" " Trail..... 7</p> <p>Depth at Breast..... 9-5</p> <p>" Hump..... 9-25</p> <p>" midway between the Head and Elevating Screw..... 7-5</p> <p>" at the Trail..... 6-5</p>	<p>but this must entail great risk of their being lost in the hurry of action as they must necessarily be removed and thrown aside whenever ammunition is required.</p> <p>CARRIAGE 12-PDR HOWITZER.</p> <p>BEAM.—The main differences between the two services in this part of the carriage, consists in the number of bolts passing through the beam horizontally, upon which there are diversities of opinion, some considering that by bracing up and keeping together the fibres of the wood, a number of bolts and nuts impart strength, whilst others hold that the resulting perforations weaken the beam. The Madras beam being tabled as well as bolted, the necessity for so many horizontal bolts as in the Royal Carriage is obviated, the latter being only bolted together.</p>
CARRIAGE 12-POUNDER HOWITZER.		
<p>CHEEKS.—The cheeks are dovetailed into the beam and secured by two bolts.</p> <p>Feet. Inches.</p> <p>Length..... 3 ... 6</p> <p>Greatest breadth..... 1 ... 2</p> <p>Breadth at the greater end..... 1 ... 0</p> <p>" " lesser 7</p> <p>Thickness..... 3-42</p> <p>not including the thickness of dovetailing which is $\frac{1}{4}$ inch.</p>	<p>CHEEKS.—The cheeks are tabled into the beam, and secured by 3 bolts, they have a swell on the inside.</p> <p>Feet. Inches.</p> <p>Length..... 3 ... 10-5</p> <p>Greatest breadth..... 1 ... 1-5</p> <p>Breadth at the greatest end..... 10</p> <p>" " lesser " 7-75</p> <p>Thickness..... 4-25</p> <p>including the Tabling which is $\frac{1}{4}$ inch.</p>	<p>CHEEKS.—The same remark applies as to the 6-Pounder Carriage. The Committee however remark that in the Royal Carriage there is a swell on the inside of each cheek which may be useful in keeping rain from soaking into the junction of the cheeks and beam.</p>

AXLE CASE.		AXLE CASE.		No remarks.
Feet.	Inches.	Feet.	Inches.	
Length.....	3	Length of upper surface.....	3	No remarks.
Breadth.....	8	" " lower ".....	3	
Thickness.....	6	Breadth.....	8	
	6	Thickness at centre.....	7	
		" " ends.....	6	
			5.5	
AXLETREE.—In every respect corresponds with the 6-Pounder Axletree.		AXLETREE.—The arms of the axle are the same as for the 6-Pounder, but a difference exists in the body.		Ditto.
		Feet. Inches.		
Length of body.....	3	Length of body.....	3	Ditto.
Breadth at the centre.....	8	Breadth at the centre.....	8	
" arms.....	3	" arms.....	3	
Thickness " ".....	3	Thickness " ".....	3	
" " centre.....	1	" " centre.....	1	
TRENNION AND GARNISH PLATES.—The same as for the 6-Pounder but the position of the trunnion boxes differ, they are thrown half a diameter in rear of the centre of axle.		TRENNION AND GARNISH PLATES.—Four bolts pass through each cheek. (Three eyebolts and one countersunk bolt.) The trunnion boxes are thrown $\frac{1}{4}$ diameter in rear of the centre of axle.		Ditto.
ELEVATING SCREW AND BOX.—The same as for the 6-Pounder. Length of Screw $15\frac{1}{2}$ inches.		ELEVATING SCREW AND BOX.—The same as for the 6-Pounder, only the length of screw is $16\frac{1}{2}$ inches instead of 18.		Ditto.
PINTLE LOOP AND TRAIL PLATE.— Ditto.		PINTLE LOOP AND TRAIL PLATE.— Ditto.		Remarks as before for 6-Pounder.
HANDSPIKE.— Ditto.		HANDSPIKE.— Ditto.		Ditto.
CHEEK SIDE BOLTS. Ditto but has only two bolts instead of three.		CHEEK SIDE BOLTS.—Has 3 bolts similar to the 6-Pounder, but is $1\frac{1}{4}$ inch thick.		Ditto.
DRAG SHOE.—Has none.		DRAG SHOE.— Ditto.		Ditto.
MINOR ARRANGEMENTS.— Ditto.		MINOR ARRANGEMENTS.— Ditto.		Ditto.

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
<p>WAGGON.</p> <p>PERCH.</p> <p>Whole length..... Feet. Inches 9 ... 3½</p> <p>Breadth..... 5½</p> <p>Greatest thickness..... 6</p> <p>Least 3½</p> <p>Length in front of framing..... 3 ... 6</p>	<p>WAGGON.</p> <p>PERCH.</p> <p>Whole length..... Feet. Inches 9 ... 3½</p> <p>Breadth..... 5½</p> <p>Greatest thickness..... 6</p> <p>Least 3½</p> <p>Length in front of framing..... 3 ... 7½</p>	<p>WAGGON.</p> <p>PERCH.—No material difference requiring any remark.</p>
<p>AXLE CASE.—The housing of the axle case into the perch and side frames is 1 inch, it is secured by iron bands bolted to the perch and side frames.</p> <p>Length..... 3 ... 8</p> <p>Breadth..... 5½</p> <p>Thickness..... 5½</p>	<p>AXLE CASE.—The housing of the axle case into the perch and side frames is ½ inch, 1 bolt passes through the centre of perch and axle case, —2 bolts through each side frame and axle case and 2 bolts through the axletree, making in all 7 bolts through the axle case.</p> <p>Length of upper surface..... 3 ... 9</p> <p>" lower " 3 ... 8</p> <p>Breadth..... 5½</p> <p>Thickness..... 5½</p>	<p>AXLE CASE.—The Committee consider the Madras system of securing the axle case to the perch fully as strong and less injurious to the axle case than the Royal Artillery method.</p>
<p>SIDE FRAMES.</p> <p>Length..... 6 ... 10½</p> <p>Breadth..... 3</p> <p>Thickness..... 3½</p>	<p>SIDE FRAMES.</p> <p>Length..... 5 ... 8</p> <p>Breadth..... 4</p> <p>Thickness..... 3½</p>	<p>Slight and unimportant differences owing to peculiarity of general construction.</p>
<p>FOOT BOARDS—has two, one at each end.</p> <p>Length..... 3 ... 6½</p> <p>Breadth..... 6</p> <p>Thickness..... 1</p>	<p>FOOT BOARDS—has four, two at each end.</p> <p>Length..... 3 ... 6</p> <p>Breadth..... 6½</p> <p>Thickness..... 1½</p>	<p>Slight and unimportant differences owing to peculiarity of general construction.</p>

<p>FRONT AND REAR FRAMES.</p> <p>Length..... 6½ Breadth..... 3 Thickness..... 2½</p> <p>CENTRE FRAME.</p> <p>Length..... 1½ Breadth..... 4 Thickness..... 1</p>	<p>FRONT AND REAR FRAMES.—Has none, the two outer foot boards answering instead.</p> <p>CENTRE FRAMES.—Has none. Not required as the ammunition waggon carries only two boxes.</p> <p>SECURING FRAMES.—Has two frames nailed on the side frames to keep the boxes in their places.</p> <p>Length..... 7½ Breadth..... 2½ Thickness..... 1½</p>	<p>Slight and unimportant differences owing to peculiarity of general construction.</p>
<p>CROSS CENTRE FRAMES.—Has two.</p> <p>Length..... 8½ Breadth..... 1 Thickness..... 2½</p> <p>WHEEL REST FOR SPARE WHEEL.—Is a block of wood cut so as to fit on the perch, over the front frame of waggon, bevelled off on the top for the wheel to rest on it.</p>	<p>CROSS CENTRE FRAMES.—Has one throughout.</p> <p>Length..... 2 Breadth..... 4½ Thickness..... 3</p> <p>WHEEL REST FOR SPARE WHEEL.—Has a block of wood with a wooden axle arm with an iron hoop at the end, and a strap of iron running over it, this goes into the nave box of the wheel, the nave rests on a block below.</p>	<p>CROSS CENTRE FRAMES.—The Royal Artillery stronger.</p> <p>WHEEL REST FOR SPARE WHEEL.—The wooden axle arm in the Royal Artillery Waggon would appear to be of great advantage with a large wooden nave, if the nave rest exactly upon the block below, but if not the wheel is too great a weight for the axle arm to support, and the latter occasionally breaks. The wheel does not appear to be steadier than the Madras wheel when the waggon is in movement, and with the brass nave in use with us it is quite unnecessary.</p>

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
<p>AXLETREE.—In every respect corresponding with the carriage axletree, has no bolt passing through it.</p>	<p>AXLETREE.—In every respect corresponding with the 6-Pounder Carriage axletree has 3 bolts passing through it.</p>	<p>Vide remark 6. Pounder Carriage under these heads.</p>
<p>PINTLE LOOP WITH TRAIL PLATE.—Has a swivelled pintle loop similar to that of the Carriage the plate is secured to the perch by two bolts.</p>	<p>PINTLE LOOP WITH TRAIL PLATE.—Fixed as in the carriage, the plate is secured to the perch by two bolts.</p>	
<p>DRAG SHOE.—Has none.</p>	<p>DRAG SHOE.—Similar to that of the carriage, when not required is placed on the perch near the pintle plate, where there is an iron hoop to secure it.</p>	
<p>AMMUNITION BOXES.—Carries 4 boxes which correspond with those on the limber.</p>	<p>AMMUNITION BOXES.—Carries only 2 boxes which differ from those on the limber.</p>	
<p>Interior length of box..... " breadth " depth Thickness of top and front board..... " " bottom, sides and rear boards.....</p>	<p>Inches Interior length of box..... 26½ " breadth 18½ " depth 17½ Thickness of boards..... 1</p>	
<p>AMMUNITION 'BOXES.—In the Royal Artillery the only ammunition boxes that correspond in dimensions are those on the 6 and 12-Pounder Waggon. The 9 and 24-Pounder Howitzer Waggon boxes differ from <i>them</i>, and from each other; while every calibre has its own peculiar limber boxes all distinct in dimensions. The Madras Artillery ammunition box on the contrary, is uniform in all respects for every calibre except as regards interior fittings, which in the nature of things <i>must</i> differ to accommodate different descriptions of ammunition.</p> <p>The Committee consider it very desirable to have all ammunition boxes alike in every respect for each particular calibre; the advantages of being able to change boxes from one limber or waggon to another, are too obvious to need further remark. They therefore prefer the Madras box.</p>		

<p>UNDER BOXES.—Carries 2 boxes under the side of the wagon in front of axle case, between the side frames and perch.</p>	<p>UNDER BOXES.—Carries 4 boxes under the side of the wagon, two in front and two in rear between the side frames and perch. Three of these boxes are intended for carrying horse shoes and nails, a small tin box is placed in each for nails, the other box for carrying grease, has 2 tin boxes which hold 14 lbs. of grease each.</p>	<p>UNDER BOXES.—The under boxes of the Royal Artillery waggon are much more commodious, but they are required for purposes which are at present unnecessary in our service—so to add to the number or size of the Madras Artillery boxes would be to increase weight without any adequate benefit.</p>
<p>SIDE BANDS.—Has two, one under each side frame, and bolted to it by 10 small bolts.</p>	<p>SIDE BANDS.—Has none.</p>	<p>Are a great source of strength and have been found requisite from past experience in marching in this country.</p>
<p>CENTRE BAND.—Under the perch and bolted to it by 8 bolts.</p>	<p>CENTRE BANDS.—Has none.</p>	
<p>WHEELS.—The same in every respect for the 6 and 12-Pounder carriages, limbers and waggons.</p>	<p>WHEELS.—The same in every respect for the 6 and 12-Pounder carriages, limbers and waggons.</p>	
<p>Diameter of wheel..... 5 feet. Dish " "..... 3 inches.</p>	<p>Diameter of wheel..... 5 feet. Dish " "..... 3 inches.</p>	
<p>NAVE.—Brass.</p>	<p>NAVE.—Wooden with an iron box.</p>	
<p>Length..... 10 inches. Greatest diameter... 13 " SPOKES. Breadth..... 3½ " Thickness..... 2 " FELLOES. Breadth..... 3½ " Thickness..... 3½ "</p>	<p>Length..... 13 inches. Greatest diameter.... 12½ " SPOKES. Breadth..... 3½ " Thickness..... 1½ " FELLOES. Breadth..... 3½ " Thickness..... 3½ "</p>	<p>Vide remarks on 6-Pounder Gun Carriage.</p>
<p>TIRE.—One solid hoop fixed to the tire by 6 ragged nails.</p>	<p>TIRE of 6 pieces, bolted and nailed on to the felloes, each piece has 4 bolts with nuts, and 2 nails. Two rivet bolts also pass through each felloe horizontally near their ends.</p>	
<p>Breadth..... 3 inches. Thickness..... ½ "</p>	<p>Breadth of Tire..... 2½ inches. Thickness, " "..... ½ "</p>	

MADRAS PATTERN.			ROYAL PATTERN.			OBSERVATIONS OF THE COMMITTEE.
WEIGHT.	cwt. qr. lb.		WEIGHT.	cwt. qr. lb.		
6-Pdr. Carriage.	{ Weight of body.. 5 2 4	{ Weight of body.... 6 1 12	{ Weight of body.... 6 1 12	{ Weight of body.... 6 1 12	WEIGHT.—The difference in weight in the 6-Pounder Carriage as well as that of the 12-Pounder Howitzer is slightly in favor of the Madras Artillery. Our Limbers and Waggon are somewhat heavier than those of the Royal Artillery, but the weight on shafts and pole is out of all proportion in favor of ours.	
	" 2 wheels.. 4 0 22					" 2 wheels.... 3 3 20
	Total weight. 9 2 26					Total weight.. 10 1 4
12-Pdr. Carriage.	{ Weight of body.. 6 2 18	{ Weight of body.... 7 1 8	{ Weight of body.... 7 1 8	{ Weight of body.... 7 1 8		
	" 2 wheels.. 4 0 24					" 2 wheels.... 3 3 18
	Total weight. 10 3 14					Total weight.. 11 0 26
Limber.....	{ Weight of body.. 4 1 24	{ Weight of body.... 3 0 25	{ Weight of body.... 3 0 25	{ Weight of body.... 3 0 25		
	" boxes.. 1 1 4					" boxes... 1 1 20
	" wheels. 4 1 0					" wheels... 3 3 15
Total weight. 10 0 0		Total weight.. 8 2 4				
Waggon.....	{ Weight of body.. 5 0 2	{ Weight of body.... 4 3 22	{ Weight of body.... 4 3 22	{ Weight of body.... 4 3 22		
	" boxes.. 2 2 8					" boxes... 1 3 10
	" wheels. 4 0 8					" wheels... 4 0 10
Total weight. 11 2 18		Total weight.. 10 3 14				
DISTANCE BETWEEN FORE AND HIND AXLES.			DISTANCE BETWEEN FORE AND HIND AXLES.			
Feet. Inches.			Feet. Inches.			
6-Pounder Carriage and Limber.. 9 94			6-Pounder Carriage and Limber.... 8 9			
12-Pdr. Carriage and Limber.. 9 74			12-Pdr. Carriage and Limber.... 8 10			
6-Pounder Waggon and Limber.. 8 14			6-Pounder Waggon and Limber.... 7 74			

DISTANCE BETWEEN WHEELS AT THE TIRES.		DISTANCE BETWEEN THE WHEELS AT THE TIRES.	
	Feet. Inches.		Feet. Inches.
Madras Pattern Carriage. { Above. 4 8½ Below. 4 8½		Royal Pattern Carriage. { Above..... 5 9 Below..... 5 1	
WOOD MADE OF		WOOD MADE OF	
Axle Case.....Saul or Peddowk.		Axle Case.....Oak.	
Checks.....Teak.		Checks.....Oak or Elm.	
Beams.....Rose, Saul, or Peddowk.		Beams.....Oak.	
Spokes.....Teak, Peemah, or Peddowk.		Spokes.....Ash.	
Felloes.....Teak, Peemah, or Peddowk.		Felloes.....Elm.	
Boxes.....Teak.		Boxes.....Deal and Elm.	
Poles.....Trincomallice, Saul, Peemah,		Shafts.....Ash.	
or Peddowk.		Naves.....African Teak.	
Naves.....Brass.			
GUN CARRIAGE MANUFACTORY, }		(Signed) J. MAITLAND, Major,	
Madras, 1st March 1858. }		Superintendent Gun Carriage Manufactory.	

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
<p align="center">CARRIAGE 9-POUNDER GUN.</p> <p>BEAM.—Composed of a solid or two half beams, tabled and bolted together, has no hump at the elevating screw. Five bolts pass through it horizontally when made of solid and six when of two pieces. Eight bolts pass through it vertically.</p> <p>Feet. Inches.</p> <p>Length of beam..... 9 0</p> <p>Breadth at breast..... 9 7</p> <p>" " trail..... 9 7</p> <p>Depth at breast..... 6 5</p> <p>" " hump..... 7 5</p> <p>" " midway between breast and elevating screw..... 8 25</p> <p>" " trail..... 5 8</p> <p>CHEEKS.—The cheeks are dovetailed into the beam, and secured by three bolts.</p> <p>Feet. Inches.</p> <p>Length..... 3 6</p> <p>Greatest breadth..... 11 5</p> <p>Breadth at the greater end..... 9 2</p> <p>Thickness " lesser dovetailing $\frac{1}{4}$ inch..... 3 42</p> <p>AXLE CASE.</p> <p>Length..... 3 8</p> <p>Breadth..... 6 6</p> <p>Thickness..... 6 6</p>	<p align="center">CARRIAGE 9-POUNDER GUN.</p> <p>BEAM.—Composed of two half beams bolted together, has a hump at the elevating screw. Seven bolts pass through it horizontally, ten vertically.</p> <p>Feet. Inches.</p> <p>Length of beam..... 9 1</p> <p>Breadth at breast..... 9 75</p> <p>" " elevating screw..... 9 75</p> <p>" " trail..... 6 25</p> <p>Depth at breast..... 7 625</p> <p>" " hump..... 10 375</p> <p>" " midway between breast and elevating screw..... 7 375</p> <p>" " at trail..... 5 75</p> <p>CHEEKS.—The cheeks are tabled into the beam, and secured by three bolts, they have a swell on the inside.</p> <p>Feet. Inches.</p> <p>Length..... 4 15</p> <p>Greatest breadth..... 10 75</p> <p>Breadth at the greater end..... 8 25</p> <p>Thickness " lesser " (including the tabling $\frac{1}{2}$ inch)..... 4 375</p> <p>AXLE CASE.</p> <p>Length of upper surface..... 3 85</p> <p>" " lower "..... 3 8</p> <p>Breadth..... 7 7</p> <p>Thickness..... 6 5</p>	<p align="center">CARRIAGE 9-POUNDER GUN.</p> <p>BEAM.—Vide remarks on "TRAIL" 6-Pounder Gun.</p>
	<p align="center">CHEEKS.—Vide remarks under this head 6-Pounder Gun.</p>	<p align="center">AXLE CASE.— Ditto.</p>

<p>AXLETREE.—Has one bolt passing through it. The axle arms are straight with a recess in the centre for grease.</p>	<p>Feet. Inches.</p> <p>Length between the arms..... 3 8</p> <p>" of each arm..... 1 1</p> <p>Breadth of axle at the centre..... 4 4</p> <p>" " arm..... 3-25</p> <p>" " " arm..... 3-25</p> <p>Greater thickness of axle..... 3-25</p> <p>Thickness in the centre..... 1-6</p> <p>Greater diameter of arm..... 3-125</p> <p>Less " 2-625</p>	<p>TRUNNION AND GARNISH PLATES.—Four bolts pass through each cheek with screws to fasten the plates on. The trunnion boxes are immediately over the centre of the axletree and are $\frac{1}{4}$ inch in thickness.</p>	<p>ELEVATING SCREW AND BOX.—The same as for the 6-Pounder Carriage.</p> <p>PINTLE LOOP AND TRAIL PLATE.— Ditto.</p> <p>HANDSPIKE.— Ditto.</p> <p>CHEEK SIDE BOLTS.—Has three bolts similar to the 6-Pounder Carriage 1 inch thick.</p> <p>DRAG SHOE.—None.</p> <p>EYE BOLTS WITH CHAINS DRAG.—None.</p> <p>MINOR ARRANGEMENTS.—The same as for the 6-Pounder.</p>	<p>AXLETREE.—Has three bolts passing through it. The axle arms are bent; the recess for grease is in the nave box instead of the axle arms.</p>	<p>Feet. Inches.</p> <p>Length between the arms..... 3 8</p> <p>" of each arm..... 1 3-875</p> <p>Breadth of axle at the centre..... 3-75</p> <p>" " arm..... 3-25</p> <p>" " " arm..... 3-25</p> <p>Greater thickness of axle..... 1-6</p> <p>Thickness in the centre..... 3-125</p> <p>Greater diameter of arm..... 2-125</p> <p>Less " 2-125</p>	<p>TRUNNION AND GARNISH PLATES.—The same remarks as under this head. The trunnion 6-Pounder Gun, here apply with respect to nails being used instead of screws. Here the number of bolts is alike, and two of the 8 bolts in the Royal Artillery Carriage pass through the axletree—whilst in the Madras Carriage they go through the axle case only. The trunnion boxes are placed alike in both carriages—there is however a difference of $3\frac{1}{4}$ cwt. in the weight of the guns.</p>
		<p>ELEVATING SCREW AND BOX.—The same as for the 6-Pounder Carriage.</p> <p>PINTLE LOOP AND TRAIL PLATE.— Ditto.</p> <p>HANDSPIKE.— Ditto.</p> <p>CHEEK SIDE BOLTS.—Has 3 bolts similar to the 6-Pounder Carriage, but $1\frac{1}{4}$ inch thick.</p> <p>DRAG SHOE.—Similar to the 6-Pounder Carriage.</p> <p>EYE BOLTS WITH CHAINS DRAG.—The same as for the 6-Pounder.</p> <p>MINOR ARRANGEMENTS.— Ditto.</p>	<p>Vide remarks under these several heads 6-Pounder Gun.</p>			

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
LIMBER FOR 9-POUNDER CARRIAGE. The same as for the 6-Pounder.	LIMBER FOR 9-POUNDER CARRIAGE. The same as for the 6-Pounder excepting the axletree which is similar to the carriage axletree.	LIMBER FOR 9-PDR. CARRIAGE.
AMMUNITION BOXES. —The same as for the 6-Pounder, but differ in the interior fittings.	AMMUNITION BOXES. —Differ in size and in the interior fittings, they are secured on the limber by ropes instead of leather straps as in the 6 and 12-Pounder Limbers.	AMMUNITION BOXES. —The same remarks as for 6-Pounder under this head.
Interior length of box..... 20 " breadth..... 17 " depth..... 14½ " Thickness of top and front boards..... 1 " " bottom, sides and rear boards..... ¾	Interior length of box..... 18½ " breadth..... 17½ " depth..... 15½ " Thickness of boards..... 1	
CARRIAGE 24-POUNDER HOWITZER. BEAM. —Composed of a solid or two half beams tabled and bolted together; has a hump at the elevating screw, 4 bolts pass through it horizontally when made of solid and 5 when of two pieces. 10 bolts pass through it vertically.	CARRIAGE 24-POUNDER HOWITZER. BEAM. —Composed of two half beams bolted together, has a hump at the elevating screw, 8 bolts pass through it horizontally and 10 vertically.	CARRIAGE 24-PDR. HOWITZER. BEAM. —Vide remarks under this head 12-Pounder Howitzer. N. B. —There is a difference of weight in the howitzers of 3 cwt.
Length of beam..... Feet. 8 Breadth at breast..... Inches. 10 " " elevating screw..... 11-5 " " trail..... 11-5 Depth at breast..... 11-5 " " hump..... 7 " " midway between the breast..... 8-25 " " and elevating screw..... 11-5 " " at the trail..... 5-8	Length of beam..... Feet. 9 Breadth at breast..... Inches. 2 " " elevating screw..... 11-75 " " trail..... 11-75 Depth at breast..... 7-25 " " hump..... 9-625 " " midway between the breast..... 10-5 " " and elevating screw..... 8 " " at the trail..... 6	

<p>CHEEKS.—The cheeks are dovetailed into the beam and secured by 2 bolts.</p> <p>Length..... 3 6</p> <p>Greatest breadth..... 1 3</p> <p>Breadth at the greater end..... 1 1</p> <p>" " lesser "..... 7</p> <p>Thickness (not including the dovetailing $\frac{1}{4}$ inch)..... 3-42</p> <p>AXLE CASE.—The same as for the 6-Pounder.</p> <p>AXLE TREE.—In every respect corresponds with the 6-Pounder axletree.</p>	<p>CHEEKS.—The cheeks are tabled into the beam and secured by four bolts, they have a swell on the inside.</p> <p>Length..... 4 6</p> <p>Greatest breadth..... 1 275</p> <p>Breadth at the greater end..... 1075</p> <p>" " lesser "..... 8</p> <p>Thickness (including the tabling $\frac{1}{4}$ inch)..... 5</p> <p>AXLE CASE.—The same as for the 9-Pounder.</p> <p>AXLE TREE.—The arms of the axletree are the same as the 9-Pounder, but a slight difference exists in the thickness of the body, being $3\frac{1}{4}$ inches in the 24-Pounder and $3\frac{1}{2}$ inches in the 9-Pounder, in all other respects they are alike.</p>	<p>TRUNNION AND GARNISH PLATES.—The same as for the 6-Pounder, but the position of the trunnion boxes differ, they are thrown half a diameter in rear of the centre of axle.</p> <p>Greatest thickness of trunnion box.... $\frac{1}{4}$ inch.</p> <p>ELEVATING SCREW AND BOX.—The same as for the 6-Pounder, diameter of screw $1\frac{1}{4}$ inch.</p> <p>PINTLE LOOP AND TRAIL PLATE.—The same as for the 6-Pounder.</p> <p>LIMBER FOR 24-POUNDER CARRIAGE.</p> <p>The same as the 6-Pounder.</p>	<p>TRUNNION AND GARNISH PLATES.—See remarks on 6-Pounder;—position of trunnion boxes different in this piece, but the Royal Artillery Howitzer is 3 cwt. heavier, and 86 inches longer than that of the Madras Artillery.</p> <p>ELEVATING SCREW AND BOX.—As before, increased diameter for extra weight</p> <p>As before.</p> <p>LIMBER FOR 24-PDR. CARRIAGE.</p> <p>Remarks generally as before.</p>	<p>TRUNNION AND GARNISH PLATES.—5 bolts pass through each cheek. The trunnion boxes are immediately over the centre of axle, Greatest thickness of trunnion box.... $\frac{1}{4}$ inch.</p> <p>ELEVATING SCREW AND BOX.—The same as for the 6-Pounder, only the diameter of screw is $1\frac{1}{4}$ inch instead of $1\frac{1}{2}$ inch.</p> <p>PINTLE LOOP AND TRAIL PLATE.—The same as for the 6-Pounder.</p> <p>LIMBER FOR 24-POUNDER CARRIAGE.</p> <p>The foot board securing the ammunition boxes is less in width being seven inches instead of nine. In all other respects it is similar to the 6-Pounder limber.</p>	<p>TRUNNION AND GARNISH PLATES.—The same as for the 6-Pounder, but the position of the trunnion boxes differ, they are thrown half a diameter in rear of the centre of axle.</p> <p>Greatest thickness of trunnion box.... $\frac{1}{4}$ inch.</p> <p>ELEVATING SCREW AND BOX.—The same as for the 6-Pounder, diameter of screw $1\frac{1}{4}$ inch.</p> <p>PINTLE LOOP AND TRAIL PLATE.—The same as for the 6-Pounder.</p> <p>LIMBER FOR 24-POUNDER CARRIAGE.</p> <p>The same as the 6-Pounder.</p>
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MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
<p>AMMUNITION BOXES.—The same as for the 6-Pounder but differ in the interior fittings.</p>	<p>AMMUNITION BOXES.—Differ in size and interior fittings.</p>	<p>Remarks as before.</p>
<p>Inches. Interior length of box..... 20 " breadth 17 " depth 14½ Thickness of top and front boards..... 1 " of bottom sides and rear boards ¾</p>	<p>Inches. Interior length of box..... 18½ " breadth 18½ " depth 17 Thickness of boards..... 1</p>	<p>AMMUNITION WAGGONS 9 & 24-PDRS.</p>
<p>The same as for the 6 and 12-Pounders.</p>	<p>The same as for the 6 and 12-Pounders. The only difference exists in the axletrees, which are similar to the 9-Pounder carriage axletree.</p>	<p>AMMUNITION WAGGONS 9 AND 24-POUNDERS.</p>
<p>AMMUNITION BOXES.—The same as for the 6 and 12-Pounder Lumber Ammunition Boxes.</p>	<p>AMMUNITION BOXES.—The same as for the 6 and 12-Pounder Waggon but differ in the interior fittings, they are secured on the wagon by ropes instead of leather straps as in the 6 and 12-Pounders.</p>	<p>AMMUNITION BOXES.—As above.</p>
<p>WHEELS.—One wheel for an Light Field calibre.</p>	<p>WHEELS.—The wheels for the 9 and 24-Pounder Carriages differ from those of the 6 and 12-Pounder, being larger in scantling, but the wheels for the 9 and 24-Pounder Limbers, Waggon, and Carts, are similar to the 6 and 12-Pounder Wheels in all respects, excepting the nave box which is made to fit the larger axle arm.</p>	<p>WHEELS.—The Committee consider the Madras system of all Light Field Battery Wheels being exactly alike, a great advantage to the service. The extra weight of Ordnance in the Royal Field Batteries accounts for the difference in weight and dimensions of their wheel, but these guns and carriages are too heavy for the horses procurable in India as specified below.</p>

DIMENSIONS.			DIMENSIONS of the 9 and 24-Pounder Carriage wheels.		
NAVE.—Brass.	Diameter of wheel.....	Feet. Inches.	NAVE.—Wooden with an iron box.	Diameter of wheel.....	Feet. Inches.
	Dish " "	5 0		Dish " "	5 0
	Dish " "	0 2		Dish " "	0 3
SPOKES.	Length of nave.....	Inches.	SPOKES.	Length of nave.....	Inches.
	Greatest diameter.....	10		Greatest diameter.....	13
	Greatest diameter.....	13		Greatest diameter.....	13½
FELLOES.	Breadth.....	Inches.	FELLOES.	Breadth.....	Inches.
	Thickness.....	3½		Thickness.....	3½
	Thickness.....	2		Thickness.....	1½
TIRE.	Breadth.....	Inches.	TIRE.	Breadth.....	Inches.
	Thickness.....	3½		Thickness.....	4
	Thickness.....	3½		Thickness.....	3½
WEIGHT.	Breadth.....	Inches.	WEIGHT.	Breadth.....	Inches.
	Thickness.....	3		Thickness.....	2½
	Thickness.....	0½		Thickness.....	0½
9-Pdr. Carriage.	Weight of body..	cwt. qr. lb.	9-Pdr. Carriage.	Weight of body....	cwt. qr. lb.
	" " 2wheels	5 3 21		" " 2wheels....	8 0 25
	Total weight.	10 0 15		Total weight..	12 2 7
24-Pdr. Carriage.	Weight of body..	7 0 18	24-Pdr. Carriage.	Weight of body....	9 1 12
	" " 2wheels	4 1 3		" " 2wheels....	4 1 12
	Total weight.	11 1 21		Total weight..	13 3 6
DISTANCE BETWEEN FORE AND HIND AXLES OF CARRIAGE AND LIMBER.	9-Pounder Carriage and Limber..	Feet. Inches.	DISTANCE BETWEEN FORE AND HIND AXLES OF CARRIAGE AND LIMBER.	9-Pounder Carriage and Limber....	Feet. Inches.
	" " " "	9 11		" " " "	9 1
	" " " "	9 7½		" " " "	9 0½

WEIGHT.—Royal Artillery 9-Pounder Gun and Carriage 5 cwt. 3 qrs. 20 lbs. heavier than that of Madras.

Royal Artillery 24-Pounder Howitzer and Carriage 5 cwt. 1 qr. 13 lbs. heavier than the Madras Ordnance and Carriage.

MADRAS PATTERN.	ROYAL PATTERN.	OBSERVATIONS OF THE COMMITTEE.
DISTANCE BETWEEN THE WHEELS AT THE TIRES. Feet. Inches. Above..... 4 8½ Below..... 4 8½	DISTANCE BETWEEN THE WHEELS AT THE TIRES. Feet. Inches. Above..... 5 3 Below..... 4 7½	
WOODS MADE OF	WOODS MADE OF	
Axle Case..... Teak, Saul, or Peddowk. Cheeks..... Teak, Peemah, Peddowk, or Rose.	Axle Case..... Ash or Elm. Cheeks..... Ash or Elm. Beams..... Oak.	
Beams..... Rose, Saul, or Peddowk. Spokes..... Teak or Peddowk. Felloes..... Teak, Peemah, or Peddowk. Naves..... Brass.	Spokes..... Ash. Felloes..... African Teak. Naves..... Ash. Shafts..... Deal and Elm. Boxes..... Ash.	
Poles..... Trincomallee, Saul, Peemah, or Peddowk. Boxes..... Teak.	All framings.....	
<p>N. B.—Judging by their reddish appearance, and the smoothness of their bores after being long in use, the Royal Artillery Light Field Guns seem to have more copper in them than those cast at Cossipore, which after use appear excoriated and the metal harder and yellow colored as if they contained more tin in their composition than the English Guns.</p>		
<p>GUN CARRIAGE MANUFACTORY, } Madras, 6th May 1858.</p>		
<p>(Signed) J. MAITLAND, Major, Superintendent Gun Carriage Manufactory.</p>		

Memorandum on the examination of Stores in use with the Royal Artillery, exhibiting the principal differences between them and those in use with the Madras Artillery.

ARTICLES.	REMARKS.
Aprons Gun.....	That in use with the Royal Artillery is made of lead; in Madras it is of painted canvas Weight 1½lbs.
Axes felling with helves.....	That of the Royal Artillery is made upon an improved principle the sides of which being curved, it is not so liable to jam in the timber from the force of the blow when felling as in the Madras muster. Weight 8lbs.
Axes Pick.....	Weight 8lbs.
Axletrees iron Light Field.....	The Royal has 3 perforations for bolts, with arm bent (Weight 92lbs.) the Madras only one, with a straight arm, and a recess for grease, which the former has not.
Axletrees spare for waggon forge.....	All Axletrees are alike in Madras for Light Field. Madras Batteries for containing Fuzes.
Bags Fuze.....	Made of canvas. Wooden Boxes are in use with Madras Batteries for containing Fuzes. Weight 1½ ozs.
Barrels containing slow match.....	In Madras the slow match is carried in rear partition of left axletree box and the spare match in small store box.
Bills hand.....	The pattern used at Madras under the head of "Hooks Bill" appears preferable. Weight 2lbs.
Bits gun steel Light Field.....	Spiral with the Royal, Gimblet Madras.
Bolts tire.....	Not in use with the Madras Batteries.
Blanket Saddle.....	Not in use in Madras.
Boxes Fuze.....	Vide remark to "Bags Fuze." Weight ½lb.
Boxes Horse Shoe.....	None in Madras.
Boxes Grease Tin.....	Two are placed under each limber in Madras. Weight 14lbs.
Buckets Water Leather.....	The leather bucket with metal rivets in use with the Royal Artillery would perhaps not answer so well in India as the wooden bucket in use at Madras. Weight 3lbs.
Cans Tin.....	Not in use at Madras. Weight 1lb.
Caps Canvas Sponge.....	Painted canvas the same as at Madras.
Cartouches leather large.....	Not in use with the Madras Batteries, with the Royal Artillery they are used for containing the Cartridges when removed from the limber boxes. Weight 6lbs.
Cartridges flannel filled bursting C. S. and S. C. S. .	Cartridges cloth are used in Madras.

ARTICLES.	REMARKS.
Cartridges flannel empty and filled.....	Differ in shape and in the method of sewing from those in use at Madras. Not in use at Madras. For containing friction tubes. Weight 2½lb. Weight 25lbs. } Similar to those in use at Madras. Weight 4½lb. }
Couples for traces.....	
Cylinders Zinc.....	
Drags or Shoes Light Field.....	
Drivers Screw for Shells.....	
Files saw hand 6 inch.....	
Funnel Copper small.....	
Fuzes driven S. C. Shot and C. S.....	
Fuze Borer. Bits Cylinder, Handles, and Bags.....	
Hammers Claw Europe.....	
Hammers Wrench Europe.....	The Claw Hammers in use with the Madras Artillery having a turnscrow at the end of the handle are preferable. Weight 1½lbs. The same as in use at Madras. Weight 1½lbs. Not in use at Madras. "Prickers Light Field" with wooden handles in use at Madras. Admirably adapted for greasing wheels, weight 18lbs. In Madras Batteries the prop and handspikes are used for that purpose. Same as at Madras. Weight ½lb. Will not be brought into use at Madras until Friction Tubes are introduced. No remarks needed.
Hooks Reaping.....	
Irons priming small.....	
Jacks lifting.....	
Knives Laboratory small.....	
Lanyards Friction Tubes.....	
Line Hambro'.....	
Locks Pad.....	
Mallets Fuze 5½ inch.....	
Mauls Wood.....	
Pickets Park.....	Similar to the Madras Pattern. Weight 10 oz. Used for driving pickets, called at Madras a Mallet. The block of the English pattern is much shorter and thicker than that at Madras. Weight 8lbs. Not carried with the Madras Batteries. The pattern is similar to those used here. Weight 11lbs. Made of iron with a sliding plug to enter the cup of the fuze to support it when the pickers are applied. The Madras pickers are of brass without the support for the cup. Weight 1½lbs. Similar to those in use at Madras. Weight 2½lbs. Similar to those made at Madras with the addition of the case being painted, probably to preserve it from insects.
Pincers Fuze.....	
Pincers Common.....	
Portfires.....	

Quadrant Brass.....	} None under observation.
Rings.. { with Starts.....	
Ropes drag.....	} Much lighter than those in use at Madras. Weight 6lbs.
Ropes dismounting.....	
Ropes—slings for guns.....	} None carried at Madras, the drag ropes being used for that purpose. Weight 14lbs.
Saws Fuze.....	
Saws hand.....	} None used at Madras for Light Field Ordnance. Weight 8lbs.
Scissors.....	
Setters Wooden for fuzes $\frac{5}{8}$ inch.....	} Similar to those in use at Madras.
Shot Canister.....	
Shells Shrapnell.....	} Differs slightly in form, but not superior to the Madras pattern. Weight $4\frac{1}{2}$ ozs.
Shot round.....	
Shafts.....	} Case unpainted, bottom wooden. Weight 84lbs.
Shovel Corn.....	
Spades.....	} Diaphragm muster not yet introduced at Madras.
Spikes Gun Spring.....	
Spike Common.....	} Fixed to wooden bottoms in the Royal Artillery, in Madras fixed to grumnets with sheep skin.
Spunges with heads rammer.....	
Stocks Portfire.....	} Not in use with Madras Batteries.
Thumbstall.....	
Turnbuckles large and small.....	} Similar to the Madras Pattern.
Tubes Brass fixed.....	
Tubes Friction.....	} Shorter, thicker at one end, and more tapered than the Madras common spike.
Wad hooks.....	
	} The Madras sponge head is made of sinnet, the Royal Artillery of wool, the rammer head of the Madras Artillery is tapped to receive a worm, which renders the wad hook unnecessary, weight of Royal Artillery sponge 4lb.
	} Longer than the Madras pattern with a screw for securing the portfire instead of a sliding ring as in the Madras pattern. Weight 1lb.
	} Not in use at Madras. The stall is placed on the left thumb, the leather on the ball of the thumb is used for cleaning the vent field, and the vent served with the thumb covered with flannel.
	} Not in use at Madras.
	} Unnecessary, vide remark to "Sponges" the scraper attached to one end, might be made to screw into the rammer the same as the worm.

*Observations of the Inspector General of Ordnance on
Article 789.*

Having at my request received from the Superintendent Gun Carriage Manufactory a very minute comparative statement of the peculiarities in construction in the Royal Artillery and Madras Light Field Carriages, the same was submitted to the Artillery Select Committee for their observations.

2. The Committee's report is so full, and the remarks of the Brigadier Commandant of Artillery so copious on every, even the least important point, that it would be needless reiteration to go over every part of the same ground. I shall confine myself therefore to a few general observations.

3. There are no very important difference of construction in the Light Field Carriages of the two Artilleries—each appears to possess some distinctive minor advantages; while the dimensions and figure of the component parts of the several Carriages approximate very closely.

4. To take, first, the 6-Pounder Gun and 12-Pounder Howitzer Carriages.—The main differences in favor of the Royal Artillery Carriages of these calibres may be thus summarized:—

First.—The hump at the elevating screw in the trail beam, which was not introduced in the Madras Carriages of these calibres, when, in 1853-54 it was added to the 9-Pounder Gun and 24-Pounder Howitzer Carriages. The hump unquestionably gives additional strength to the beam.

Second.—The tabling of the cheeks into the beam (the practice in Madras being dovetailing) is preferred by the Committee. But which process is the better is very doubtful; the Madras Artillery formerly tabled, but adopted dovetailing as a supposed improvement. The former practice should not be reverted to without due deliberation and experiment.

Third.—The bent axletree arm. The Committee do not positively declare in favor of the bent axletree arm as now used by the Royal Artillery, but some modification of it. The bent axletree arm causes the wheels to have a less distance apart below than above and thereby narrows the base. The distance above is 5 feet 5 inches, the distance below only 4 feet 9 inches. This is far from an advantage: for, over rough ground the centre of gravity is from the narrowness, more liable to be shifted to the extremities of the base; and thus at its maximum need, reduce the carriage to its minimum stability. In adopting this peculiarity there can be but one object, and that is, to enable the wheels of the Madras Carriages to fit the Royal Artillery Carriages. As it is, the wheels of the Madras Carriages are alike for all the four calibres, viz. 6 and 9-Pounder Guns and 12 and 24-Pounder Howitzers, and are perfectly interchangeable; whereas, the wheels of the Royal Artillery Carriages can be used, the 6-Pounder only with the 12-Pounder Howitzer, and the 9-Pounder only with the 24-Pounder Howitzer Carriages. It certainly is a great draw back that the wheels of the carriages of both Artilleries cannot be used reciprocally; and as all our measures should have reference to operations in the Field, the advantages that would accrue from uniformity, may be balanced against the disadvantage of the narrow base above adverted to, and a verdict given in its favor. And I must add that this assimilation can be effected without abandoning the metal nave of the Madras Artillery, and to which point I shall presently advert.

5. The chief differences in favor of the Madras Artillery Carriages are briefly:—

First.—The entire uniformity of wheels as above stated.

Second.—The perfect similarity there is between all the ammunition boxes, both limber and waggon; whereby, on emergency one can be substituted for the other; and which is not the case with the Royal Artillery Carriages.

Third.—Our mode of housing the axle case into the beam, and our manner of fastening the Trunnion and Garnish Plates are superior contrivances.

Fourth.—The existence of detached elevating screws which are supposed to be less trying to the carriage than screws fixed to the breech.

Fifth.—The movement of the pintle loop on a swivel attached to the centre of the end of the trail plate. In the Royal Artillery carriages the pintle loop is fixed to the trail plate.

Sixth.—The vertical eyes on the splinter bar loops which afford great facilities for releasing horses on occasions of accident.

6. There are many other minor points, but the above will suffice to shew that the Madras Artillery equipments possess excellencies peculiarly their own, and which, if not recognized to be such by the Royal Artillery, should still be preserved unaltered.

7. I do not also discuss the question of the use of Pole instead of Shaft for draught. The highest authorities are greatly divided in opinion on this point, and perhaps the adoption of either may depend much upon the nature of the service in which engaged.

8. The Carriages for 9-Pounder Gun and 24-Pounder Howitzer are constructed in the Royal and Madras Artilleries respectively on the same principles as those of the 6-Pounder Gun and 12-Pounder Howitzer. The same approximations in dimensions are observable, and likewise the same excellencies and defects.

General Remarks.

9. In connexion with this subject, I must not omit to notice, that the wheels of the Madras Artillery carriages are,

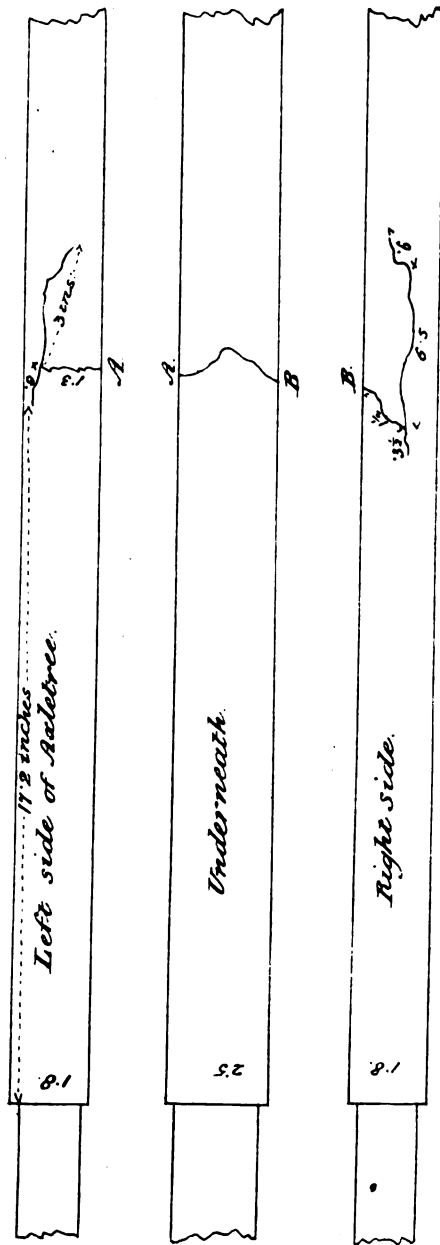
in consequence of the use of the brass nave, superior in durability to those of the Royal Artillery, and are more economical because of the absence of any necessity to maintain reserves, and I cannot refrain from urging on the authorities in England, the experimental construction of brass and wrought iron naves for Light Field Carriages; during many years service, I have never felt the slightest anxiety about reserve naves for our Light Field wheels, and at present I have more reserve naves in the Arsenal of Secunderabad, to meet expected demands for the Royal Artillery Troop than are contained in all the Madras Arsenals to meet demands for the Madras Artillery. The idea of the brass naves was taken from the Artillery of the Sultan of Mysore, and the credit of introducing it was given to the Duke of Wellington; it certainly was in use with his Force, and greatly facilitated the repair of his wheels. On a recent examination of certain wheels of the Royal Artillery Carriages which were sent to the Gun Carriage Manufactory to be set up, the Superintendent had occasion to write, "one nave was found on both ends to have a circle of wedges inserted in order to keep the nave box tight in its place. The English nave boxes being of cast iron, will not admit of being driven tight into the nave, as cast iron is liable to be broken if driven with the same force as a more ductile metal, consequently, the iron box was let in quite loose, and afterwards wedged in tight. This practice is considered objectionable by the Madras Artillery, and is not allowed;" on perusing these observations, the utility of the brass nave becomes apparent. But it is not in this respect alone that our wheels claim superiority. The same examination made by the Superintendent Gun Carriage Manufactory shewed that of the wheels of the Royal Artillery carriages, several spokes were splintered and patched up, the broken spokes shewed strong symptoms of decay, several felloes were cracked and split and had to be rejected; and the whole of the wheels were well primed with paint and putty.

10. The somewhat larger dimensions of the Royal Artillery carriages may be accounted for as regards 9-Pounder Gun and 24-Pounder Howitzer carriages because they are required to carry a larger weight of metal, that is 13 cwt. in the Royal Artillery to 10 cwt. in the Madras, the latter being the weight of the Indian cast pieces of these calibres. The weights however of the 6-Pounder Gun and 12-Pounder Howitzer are equal in both Artilleries. Another reason for the larger dimensions of the Royal Artillery carriages may be found in the number of perforations which the mode adopted in putting the component parts together occasions. This is a decided defect, or rather would be in our carriages, but how far the apparent evil is counteracted by the strength of the fibre of the wood, I am not here prepared to consider.

11. On the whole, there is a very great general assimilation between the carriages of the two Artilleries. I use the term general, because I have already indicated there are minor points of difference in the various parts or details. The Royal Artillery 6-Pounder Gun and 12-Pounder Howitzer and the Indian cast pieces of the like calibre, can be used promiscuously with the carriages (6-Pounder Gun and 12-Pounder Howitzer) of both Artilleries, and so may the heavier pieces (9-Pounder Gun and 24-Pounder Howitzer) with the carriages intended for these calibres. The cheeks of the carriages of the four calibres being alike in pattern, may, on emergency, in the event of accident, be with little difficulty fitted on to the beams of the carriages of either Artillery; the only obstacle to contend against being the slightly varying dimensions.

12. It would I fear be hopeless to expect the Royal Artillery to adopt modifications in assimilation with the Madras Artillery, without prolonged discussion. But whatever decision with reference to the Royal Artillery may be come to on perusing the Comparative Statements, I think we should without hesitation, adopt in the construction of our carriages

Artillery Select Committee.



A.A. B.B. The Cracks.

N.B. The crack does not extend to the upper side.

all those points of superiority in the Royal Artillery carriages which this examination has brought to light. I leave it to His Excellency the Commander-in-Chief to specify the points, merely recommending the dimensions of the Royal Artillery for our future carriages.

ARTICLE 790.

ON INJURIES SUSTAINED BY CERTAIN CARRIAGES IN USE WITH THE B. TROOP, MADRAS HORSE ARTILLERY AT SECUNDERABAD.

The Inspector General of Ordnance and Magazines forwards^(a) observations^(b) of the Superintendent of the Gun Carriage Manufactory on injuries sustained by the above mentioned Carriages, and request the same may be submitted to the Select Committee.

The undermentioned documents are laid before the Committee.

- (c.) No. 290.
11th May 1858. 1. *Letter^(c) from Captain A. T. Cadell, Commanding B. Troop Madras Horse Artillery, to the Director of the Artillery Depot.*—Reports, that the axle of No. 18 Ammunition Waggon was found after a light marching order parade to be all but broken through.—The axle is of the old pattern and much lighter than those now in use; The waggon bears the year of construction of 1829.—Also reports that a crack has shewn itself in the left beam of the trail of No. 36, 6-Pounder Gun Carriage.—Encloses Sketches^(d) of the cracks both in the axle and trail.
- (d.) Plate 121.
- (e.) No. 172.
22nd May 1858. 2. *Letter^(e) from the Commandant of Artillery to the Inspector General of Ordnance and Magazines.*—Forwards copy of the above letter,

together with copy of a Memo. from the Officer Commanding Artillery Hyderabad Subsidiary Force.

No. 392.

MEMO.

"The axletree is too slight in every respect, and has cracked at a place where it had originally been welded in a most unworkmanlike manner, the iron at the place of welding was burnt to the extent of half the thickness of the axletree, and it should never have been replaced in the axletree case.—The beam of the Gun Carriage is cracked at present slightly, I have directed the paint to be scraped off in order that its extent may be ascertained and progress watched."

(Signed) R. C. MOORE, Bt. Lt. Col.,
Comd. Arty. H. S. Force.

(b.) No. 499,
28th June 1858.

Extract from a letter^(b) from the Superintendent Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines.—"I have the honor to state that the axle alluded to as cracked, appears to have been imperfectly forged, nevertheless it has stood 29 years wear and tear, and as the pattern is considered too slight in every respect, it seems to have stood more work than might have been expected of it."

"The half beam said to be cracked, is of Peddowk wood, and of a Batch reported on to the Military Board on 28th February 1853, which proved very satisfactory. The crack may turn out to be of no importance."

OPINION.—The age of this Carriage sufficiently accounts for the fracture of the axletree.

The Committee await further reports on the Peddowk Beam before pronouncing an opinion.

Observations of the Inspector General of Ordnance on Article 790.—The Inspector General concurs in the opinion recorded by the Select Committee on this Article.

ARTICLE 791.

ON FRACTURED 9-POUNDER CARRIAGES OF THE BATTERY
OF THE NAGPORE IRREGULAR FORCE.

The Inspector General of Ordnance and Magazines forwards^(a) observations^(b) of the Superintendent of the Gun Carriage Manufactory, on broken 9-Pounder Carriages of the Battery of the Nagpore Irregular Force, and requests the same may be submitted to the Select Committee.

(a.) Extract Proceedings
No. 2877, 3rd July 1858.
(b.) No. 501.
28th June 1858.

Extract from letter^(b) from the Superintendent Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines.—"Of the four 9-Pounder Carriages whose Beams broke down, one is said to have been of sound Peddowk wood and the others of Teak of inferior quality."

"It is easy to reconcile the Teak wood Beams breaking, but, with good powder and the Carriage well set up before being used, I cannot understand how a good Peddowk beam should give way.—These accidents will doubtless occur under the most favorable circumstances, but having sent up country Saul and Peddowk Beams to replace those of Teak wood, it is to be hoped they will stand in spite of the reduced windage and greater work they now have to bear when attached to Horse Batteries."

The undermentioned documents are laid before the Committee.

(c.) No. 250,
12th May 1858.

1. Letter^(c) from Colonel J. Millar, Commanding Nagpore Force, to the Inspector General of Ordnance and Magazines, forwarding Proceedings^(d) of a Committee of Survey held at Seetabuldee to examine and report on the broken Carriages of the Battery of the Nagpore Irregular Force.

(d.) Dated
5th May 1858.

Proceedings of a Committee of Survey held agreeably to orders by Colonel C. Holl, Commanding Nagpore Force, to examine and report on the following Carriages.

President.

Bt-Major JOHN EDWARD MAWDSLEY, Horse Artillery.

Members.

Bt. Captain WILLIAM FERGUSON BEATSON LAURIE, Acting Commissary of Ordnance Nagpore Force.

Lieutenant EVERARD STEPNEY MILMAN, Horse Artillery.

The Committee having assembled pursuant to order proceeds to examine the undermentioned Carriages, which were broken down during Proof, and on Field Service.

Description.	Number.	Marks.		Weight.			Remarks by the Committee.	
		Initials.	Year.	Number.	Cwts.	Qrs.		lbs.
Carriage Gun 9-Pounder A. S. C. P. assimilated.	1	J M	1852	6	11	0	8	The Carriage is made of Teak wood. It is stated to have broken down during Proof at the 5th round firing P. B. The Beam is broken into two pieces, the fracture commencing in front of the Elevating Screw box, and extending up to the Axletree Bed. The wood appears perished, and in the fracture there are particles of dust similar to dry rot.
Carriage Gun 9-Pounder A. S. C. P. assimilated.	2	J M	1852	3	10	3	18	The Beam of the Carriage is made of Peddowk, the Cheeks of Teak. It is stated that at the 3rd round, medium elevation $3\frac{1}{4}^{\circ}$ the beam cracked at its junction with the axletree bed, the axletree bed cracking diagonally at the same time—at the 3rd round maximum elevation $6\frac{1}{2}^{\circ}$ the Beam broke down at the Elevating Screw, the fractures extending as in the last Carriage from the elevating screw box to the axletree bed. The wood of the Beam appears good, but the teak cheeks appear very dry.

(CONTINUED.)

Description.	Marks.			Weight.			Remarks by the Committee.	
	Number.	Initials.	Year.	Number.	Cwts.	Qrs.		lbs.
Carriage Gun 9-Pounder A. S. C. P. assimilated.	3	J M	1852	5	11	0	0	The Beam of this Carriage is Teak, the Cheeks of Peddowk. The Beam is broken exactly in the same place as in the other two Carriages— the wood appears also perished, very dry, and brittle. This Carriage was broken down when on Field Service but no information on the subject is obtainable.
Carriage Gun 9-Pounder A. S. C. P. assimilated experimental.	4	J M	1852	2	10	1	15	The Beam of this Carriage was broken on Field Service, and exactly in the same way as the other Carriages, but no further information can be obtained. The Beam was replaced by one made of Jungle wood (very like Saul.) The initials, number, &c., are taken from the Register in the Arsenal.

SEETABULDEE, }
5th May 1858. }

(Signed) J. E. MAWDSLEY, Major,
M. H. A. President.

(") W. F. B. LAURIE, Bt. Capt.,
Acting Commissary of Ordnance N. F. }
(Signed) J. MILLAR, Col., (") E. S. MILMAN, Lieutenant, }
Commanding Nagpore Force. Horse Artillery. } Members.

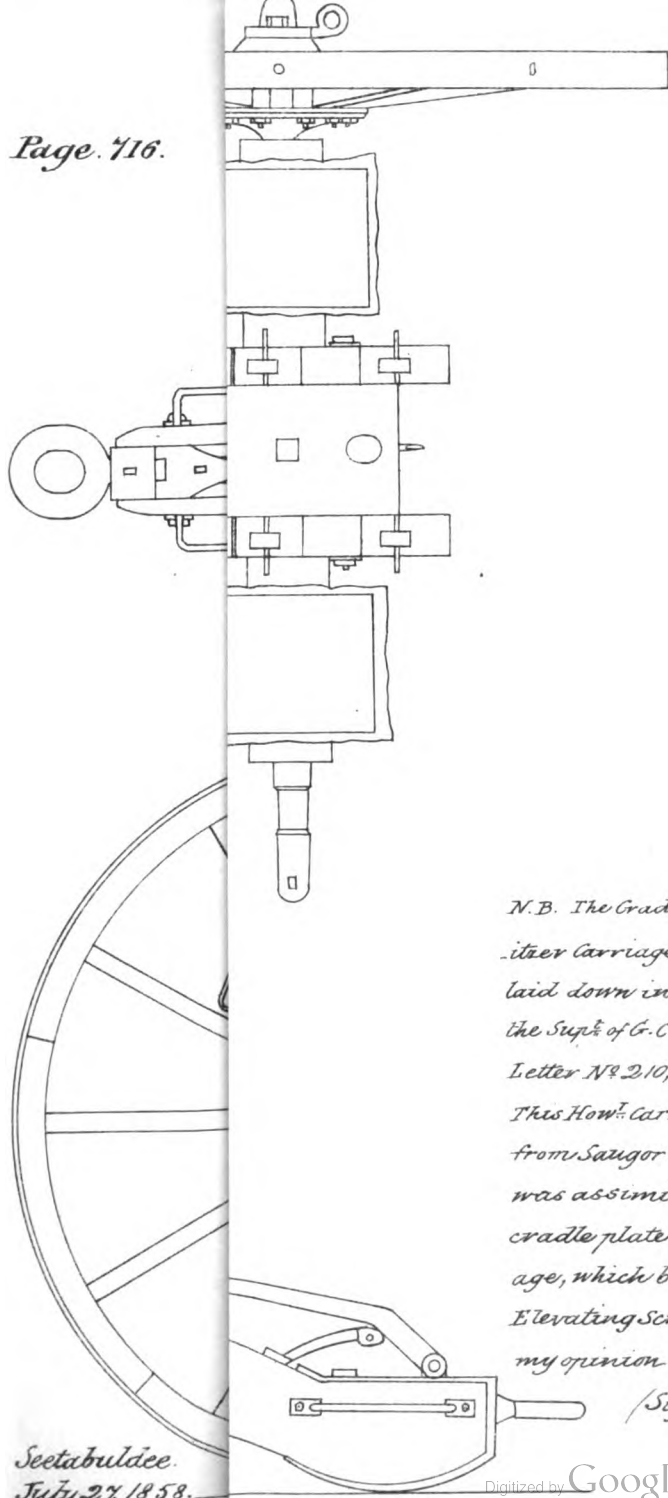
(e.) No. 221,
7th July 1858. 2. *Letter^(e) from the Commandant of Artillery to the Inspector General of Ordnance and Magazines.*—Suggests that an application be made for sketches of the broken 9-Pounder Carriages of the Battery of the Nagpore Irregular Force for submission to the Artillery Select Committee.

(f.) No. 4131,
11th August 1858. 3. *Extract^(f) from the Proceedings of the Inspector General of Ordnance and Magazines,* forwarding sketches of two Carriages now in the Arsenal at Nagpore which failed while in use with the Nagpore Irregular Horse Field Battery. (Plate 122.)

(g.) No. 4648,
25th August 1858. 4. *Letter^(g) from the Inspector General of Ordnance and Magazines to the Brigadier Commandant of Artillery.*—Forwards rough sketch (Plate 123) of a fractured 9-Pounder Carriage, which failed while in use with the Nagpore Irregular Horse Field Battery furnished by Lieutenant Playfair, and states that the sketch is intended to represent the breakages of two 9-Pounder Carriages, but that Lieutenant Playfair has explained only one of them in these words “in one the fracture is complete and the trail in two pieces, as shewn by the dotted red lines in the sketch.”

With reference to the other breakage, the Ordnance Officer states that it is not possible to ascertain the point of breakage, owing to the circumstance that a new country trail was put on the Carriage, and which was done somewhere on Service.

OPINION.—The case of these Carriages (generally of Teak) closely assimilates with those of many others which have of late years been brought under the notice of the Committee, shewing the utter untrustworthiness of this wood for Beams. The circumstances of the fracture of the Peddowk Beams being unknown, can offer no



N.B. The Cradle Plates on this Howitzer Carriage are not fixed as laid down in Plan received from the Sup^t of G. C. Manufactory with Letter N^o 210, dated 5th May 1853. This Howitzer Carriage was received from Saugor Arsenal where it was assimilated, except putting cradle plate with slope of carriage, which being put with line Elevating Screw, may have in my opinion caused breakage.

(Signed) W. F. B. L.

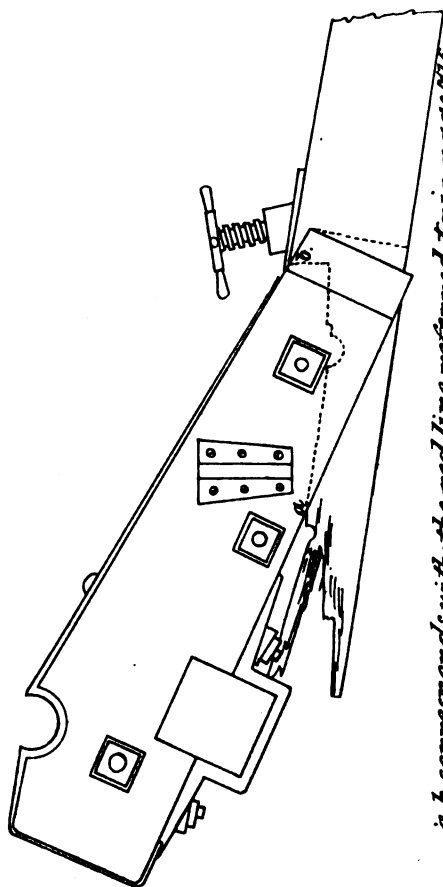
A. C. O. N. I.

Seetabulace.
July 27/1858.

Artillery Select Committee

Page 716. *Meeting 199, Article 791.* *Plate 123.*

Sketch of a fractured 9 Pdr. Carriage which failed while in use with the Madras Irregular Horse Fd Battery.



a. b. corresponds with the red line referred to in page 716.

opinion thereon, but observe that the occasional failure of the best description of wood, can hardly be matter of surprise.

Observations of the Inspector General of Ordnance and Magazines on Article 791.—The Inspector General has already submitted to Government a report on the breakages of these Carriages in his letter No. 581, dated 21st December 1858, which has been communicated to the Commissioner of Nagpore as per Extract Minutes of Consultation No. 26, dated 4th January 1859.

ARTICLE 792.

ON A METHOD OF SECURING THE AMMUNITION BOXES OF GUN AND WAGGON LIMBERS, PROPOSED BY MAJOR J. E. MAWDSLEY, IN CONTINUATION OF MEETING 192, ARTICLE 728, OF 25TH NOVEMBER 1856.

The undermentioned documents are laid before the Committee.

- (a.) No. 513,
22nd December 1856. 1. *Letter^(a) from the Director of the Artillery Depot to Major J. E. Mawdsley, Commanding D. Troop Horse Brigade.*—Forwards Extract from the Proceedings of the Artillery Select Committee^(b) and requests that the proposed method for securing Ammunition Boxes be brought into use with the Troop for one year, and a report then submitted for the final decision of the Artillery Select Committee.
- (b.) Meeting 192,
Article 728
25th November 1856,
Artillery Records, page 511.
- (c.) No. 220,
9th August 1858. 2. *Letter^(c) from Major J. E. Mawdsley, Commanding D. Troop Horse Brigade to the Director Artillery Depot.*—States that at the time of the receipt of the above letter the whole of the Ammunition Boxes of the Gun Limbers had the small

pin which passes through the hurter clamp and Lashing Bar attached to them, as well as the Lashing Eye Staples on Lashing Bars. He had therefore to remove the Lashing.

Reports that the Ammunition Boxes of Gun Limbers have been in use since the above date, without any side lashing, and considers the small pin sufficient to hold on the Box temporarily, should the rear lashing at any time give way, which it has done on two or three occasions while the pin has been under observation; but does not think it would be so for any distance over bad roads, the weight of the Box would tear away the Hurter Clamp if unsupported.

Conceives no objection to the side lashing from Ammunition Box handles to the lashing eyes on the end of lashing bars on Limbers. An Ammunition Box seldom or ever sits evenly on the Axletree bed, and when full of Ammunition there is great strain alternately on the Hurter Clamp and rear lashing (the Hurter never fits tight into the socket); the side lashing would effectually prevent this. If on Service a Box be required to be removed for any purpose, one cut with a knife is sufficient to sever the lashing, and it need not be relashed till convenient. Would strongly recommend the side lashing, which will save wear and tear of the Ammunition, as well as of the Boxes themselves. Would also propose that the small pin be made longer, so as to admit of a key being passed through the end of it, to prevent its jolting out, which it may do.

OPINION.—The Committee are of opinion that two hurters of additional strength on each limber box instead of one, secured by a stout keyed pin, and the box lashed as at present with one lashing behind, will best provide for the security of the boxes under any circumstances, and recommend the adoption of the same accordingly.

Observations of the Inspector General of Ordnance and Magazines on Article 792.—The Inspector General concurs in the opinion recorded by the Select Committee on this Article, and recommends that the suggestion of securing the Ammunition Boxes of Gun and Waggon Limbers be adopted.

Observations of the Commander in Chief and Orders of Government on Articles 789 and 792 of Meeting 199.

Letter from the Adjutant General of the Army Fort Saint George, 20th May 1859, No. 515; to the Secretary to Government Military Department.

ARTICLE.

789. On the difference in construction between the Carriages and patterns of Stores of the Royal and Madras Artilleries, with observations of the Inspector General of Ordnance and Magazines, and report of the Brigadier Commandant of Artillery.

790. On injuries sustained by certain Carriages in use with the B. Troop Madras Horse Artillery at Secunderabad, with observations of the Inspector General, on Article 790 and 792.

791. On fractured 9 pounder Carriages of the Battery of the Nagpore Irregular Force, with observations of Inspector General.

792. On a method of securing the Ammunition Boxes of Gun and Waggon Limbers proposed by Major J. E. Mawdsley.

to 792, and other documents as per margin, and with reference to Article 789, I am directed to submit the following remarks on the observations of the Inspector General of Ordnance and Magazines.

Opinion of the Inspector General.

Para. 4, Clause 2nd. It is doubtful which process is the better, tabling or dovetailing, and that the former practice which obtained in the Madras Artillery, should not be reverted to without due deliberation and experiment.

Para. 4, Clause 3rd.

As all measures should have reference to operations in the Field, the advantage from uniformity may be balanced against the disadvantage of narrow base.

of the Inspector General and His Excellency thinks his

I have the honor by order of the Commander in Chief, to forward for submission to the Honorable the Governor in Council, Extracts from the Proceedings of the Permanent Artillery Select Committee, Articles 789

1. The Commandant of Artillery is of opinion that experience is in favor of tabling.

2. The Commander in Chief quite agrees in this view

reasoning is quite conclusive in favor of retaining the present axletree.

Para. 5, Clause 2nd.

The perfect similarity between all the Ammunition Boxes, both Limber and Waggon, that on emergency, one can be substituted for the other, which is not the case with the Royal Artillery Carriages.

Para. 5, Clause 3rd.

The Madras Artillery mode of housing the axle case into the beams and the manner of fastening the Trunion and Garnish plates are superior contrivances.

Opinion of Inspector General.

Para. 5, Clause 4.

The existence of detached elevating screws which are supposed to be less trying to the Carriages than screws fixed to the breach.

The advantages are in favor of the fixed elevating screws of the Royal Artillery which are also in use with the Bengal Artillery for Light Field (Guns,) although the Committee which assembled in Calcutta in 1836 recommended the introduction of the Capstan headed elevating screws, but conjectures they have found the former to answer better, and their Artillery have had much experience within the last few years, while great complaints have lately been made by the Artillery Officers in General Whitlock's Force, of the loose elevating screws, which is the one in use with the Madras Artillery for years.

Opinion of the Inspector General.

The movement of the pintle loop on a swivel attached to the centre of the end of the Trail plate. In the Royal Artillery Carriages the pintle loop is fixed to the Trail plate.

Opinion of the Inspector General.

The vertical eyes on the splinter bar loops which afford great facilities for releasing horses on occasion of accidents.

It has been supposed, that the vertical eyes as in use, give greater facility in hooking and unhooking, and that the trace hooks are less likely to get jammed. It would be very desirable to have the sharp edges underneath the splinter bar rounded off, as horses legs are constantly very severely injured by kicking. This applies equally to the Royal and Madras Artillery Carriages.

Opinion of Brigadier Commandant of Artillery.

3. The Commander in Chief concurs in the opinion of the Inspector General as herein expressed.

4. The Commander in Chief concurs with the Brigadier Commandant of Artillery on this point.

5. The Commander in Chief has no doubt of the superiority of the swivel over the fixed loop.

6. The Commander in Chief agrees on this point with the Brigadier Commandant of Artillery.

7. I am further directed to observe that as it has now

been determined not to send any more Royal Artillery

to India, and in any event no more Royal Artillery material or equipment, it appears unnecessary to pursue the subjects of comparison further at present.

ORDER No. 3432, 27th September 1859.

The Governor in Council proceeds to pass orders on such points connected with the above recorded Proceedings of the Artillery Select Committee as require to be noticed.

The Governor in Council concurs with the Commander in Chief on the points adverted to in the foregoing letter from the Adjutant General of the Army, and approves of the adoption of the proposition under the several paragraphs of the above referred to letter as follows.

Meeting 199.
Article 789.

1. That tabling be re-established.
2. That the present axletree be retained.
3. Requires no remark.
4. The Governor in Council concurs with the Commander in Chief, that the fixed elevating screw is to be preferred.
5. That the swivel loop be retained.
6. Requires no remark, except that the suggestion of the Brigadier Commandant should receive attention.

The Governor in Council concurs also with His Excellency, that further comparison of the material and equipment of the two Artilleries is not at present required.

Meeting 199. }
Article 792. } Sanctioned.

MEETING 200.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL P. HAMOND, DRI-SACIER COMMANDANT OF ARTILLERY.

Artillery Depôt, Saint Thomas' Mount, 30th September 1858.

PRESENT.

COLONEL J. W. CROGGAN, *Commanding 5th Battalion Artillery.*

MAJOR G. W. Y. SIMPSON, *Acting Principal Commissary of Ordnance.*

MAJOR G. BRIGGS, *Acting Director Artillery Depot.*

LIEUT.-COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*

MAJOR G. ROWLANDSON, *Acting Superintendent Gun Powder Manufactory.*

MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*

CAPTAIN R. MORTON, *1st Battalion Artillery.*

LIEUTENANT W. D. FORSTER, *5th Battalion Artillery.*

ARTICLE 793.

ON AN AMENDMENT OF THE RULES ESTABLISHED FOR THE GUIDANCE OF THE PERMANENT ARTILLERY SELECT COMMITTEE IN THEIR PROCEEDINGS.

Opinion of the Committee returned for revision. (See Article 808.)

ARTICLE 794.

ON AN IMPROVED METHOD OF PRIMING MORTARS WITH QUICK MATCH.

(a.) No. 1763,
8th September 1858. The Adjutant General of the Army forwards^(a) the undermentioned Correspondence received from Bengal relative to an improved method of priming Mortars with Quick Match, and requests the Select Committee may be called on for a report on the subject.

(b.) No. 3075.
27th August 1858. I. *Extract^(b) from Minutes of Consultation, with,*

2. *Copy of letter from Officiating Secretary to Government M. D. to the Secretary to Government M. D.--Transmitting copy of the following letter with annexments.*

(d.) No. 597,
14th June 1858. 3. Copy of letter^(d) from Colonel J. Turton in temporary Command of Bengal Regiment of Artillery, to the Deputy Adjutant General of the Army.—Forwards the two following documents.

(e.) No. 413,
9th May 1857. 4. Copy of letter^(e) from the Secretary Bengal Permanent Artillery Select Committee to the Assistant Adjutant General of Artillery, Meerut.—Forwards letter^(f) from the Director Artillery Depot of Instruction Meerut, recommending an improved method of priming Mortars, with the Committee's recommendation that the proposed method may be introduced at the three Presidencies.

(f.) No. 113,
9th April 1857. 5. Copy of letter^(f) from the Director Artillery Depot Meerut, to the Secretary Bengal Permanent Artillery Select Committee.—“ I have the honor to request you will bring to the notice of the Select Committee the following improvement in the method of priming Mortars, which has been carried out during the whole of the last Practice Season at this Station with the most complete success.”

“ The plan was described in a number of the United Service Magazine which contained an Article on the subject of improvements in firing guns &c., and was said to be used with success in the Prussian Artillery.”

“ All Officers are aware of the difficulty in priming a mortar with quick match, when the latter has lost its stiffness from damp or been injured by handling, but by the simple method of enclosing the match in a tube of writing paper, a little smaller than the vent, the quick match is effectually protected from any handling, and the comparative rigidity of the paper tube renders its insertion in the vent an easy matter.”

“ The Match also burns with much greater quickness and I strongly recommend that the adoption of this method of priming Mortars be brought to the notice of Government for their sanction.”

OPINION.—Experiments having been made with quick match prepared in the mode recommended by the Bengal Select Committee, it was found that small charges were not sufficiently powerful to blow the paper tubes out of the vent, and on one occasion with a new 10 Inch Mortar after a round with a 2lbs. charge, a part of the paper was left smouldering in the vent, the remains of the tube passing into the chamber on introducing the Match for the next round.

2. The Committee are not aware of any difficulty ever having been experienced in the introduction of Quick Match into the vent of Mortars, and even in cases of its being much broken, it is always passed with ease with the assistance of a common pricker wound round the point, whilst the danger of accident which their short experience with this paper tube has brought under their notice, induces them decidedly to object to its introduction.

Observations of the Inspector General of Ordnance on Article 794.—The Inspector General of Ordnance concurs in opinion with the Select Committee that the introduction of the paper tube offers no advantages that would compensate for the attendant danger of accident.

Orders of Government on Article 794.—Has been communicated to the Government of India.

ARTICLE 795.

ON THE INSECURITY OF THE BUCKET HOOKS OF LIGHT FIELD CARRIAGES, AS ALSO THE HOOKS TO WHICH THE SPARE AXLE IS ATTACHED.

[a.] dated • A letter^[a] from Captain J. D. Scott,
26th August 1858. Commanding No. 5 Horse Field Battery,
Bangalore, bringing the above defects to notice, is laid

before the Committee by order of the Brigadier Commandant of Artillery.

Extract from letter^[a] from Captain J. D. Scott.

“ The Bucket hooks on the front of Gun and Howitzers, Beam trail patterns, are I consider faulty; they are simply screwed in *with* the grain of the wood; every one of mine gave way on the march—they first drooped—then drew a little, and ultimately snapped off—they should I think be screwed through an iron plate.”

“ The hooks to which the spare axletrees under a waggon are suspended are scarcely strong enough—two of mine gave way on the march.”

OPINION.—The Committee concur in opinion with Captain J. D. Scott, that the Bucket hooks of Light Field Carriages, and hooks for suspending the spare axle under the waggons, are not sufficiently strong, more particularly as these defects have recently been brought to notice by Major Mein, now serving with the Saugor Field Force, and suggest that Captain Scott be permitted to carry out his own suggestion with two of his Carriages and report results after sufficient trial;—also that a copy of Captain Scott's proposition be forwarded to Major Mein, with a view to his carrying out the same experiment.

Observations of the Inspector General of Ordnance on Article 795.—The Inspector General of Ordnance agrees with the Committee, and would desire to see the suggested alterations made and reported on.

Orders of Government on Article 795.—The alterations and trial proposed, sanctioned.

MEETING 201.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL P. HAMOND, BRIGADIER COMMANDANT OF ARTILLERY.*Artillery Depot Saint Thomas' Mount 23rd November 1858.***PRESENT.**

LIEUT. COL. G. W. Y. SIMPSON, *Acting Principal Commissary of Ordnance.*
 LIEUT. COL. G. BRIGGS, *Acting Director Artillery Depot*
 LIEUT. COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory*
 MAJOR G. ROWLANDSON, *Acting Superintendent Gun Powder Manufactory.*
 MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*
 CAPTAIN H. W. LUMSDEN, *5th Battalion Artillery.*

ARTICLE 796.**ON TRANSPORT CARRIAGES AND LIMBERS FOR HEAVY ORDNANCE.**

The Inspector General of Ordnance and Magazines directs^[a] that two Transport Carriages which have lately been altered, be submitted for the opinion of the Artillery Select Committee, with the view to determining the most suitable Carriage for the Transport of Heavy Ordnance in this Presidency.

The undermentioned documents are laid before the Committee.

[a.] No. 6145
1st October 1858.

1. *Extract^[b] from Proceedings of Inspector General of Ordnance and Magazines.*—Directing the Superintendent Gun Carriage Manufactory to send the two Transport Carriages to the Mount for examination.

[c.] No. 353
29th September 1858.

2. *Letter^[c] from the Commandant of Artillery to the Inspector General of Ordnance and Magazines.*—Reports that the two Transport

Carriages appear on examination to be similar in pattern to the one in the Field Train, except that the lashing bars of the new Carriages are covered with sheet iron.—The wheels of the new Limbers are 8' Inches larger in diameter and $\frac{1}{4}$ inch broader in the tire than those of the old Limbers.

OPINION.—The Committee consider the increased height of the Limber wheels a great advantage, but as it involves the necessity for additional space to turn in, they recommend that the framing of the Transport Carriage be brought several inches closer together, both in front and rear, which will not only obviate this evil, but also add considerably to the strength of the cross bars. This would however render it advisable to make a corresponding reduction in the length of the axle, which may very easily be done, as the wheels are much farther apart than those of the limber, and with the centre of gravity so near the ground, the Carriage could never capsize. They found that with a 68 Pounder slung to the Carriage (the largest gun in the Service) there is ample room for this.

Observations of the Inspector General of Ordnance on Article 796.—The Carriages referred to are required for moving 68 Pounder Guns of 95 Cwt. The alterations recommended by the Committee are very desirable, and essential to the efficiency of the Carriages in relation to the increased height of the limber wheels, and the Inspector General fully approves of their being carried out.

2. The despatch of Guns having been long delayed, the Inspector General, has, pending the sanction of Government to the recommendation of the Select Committee, ordered the alterations to be made, and the Transport Carriages to be sent off with 2—68 Pounders and appurtenances complete to Secunderabad, one of the Stations to which Government approved of Ordnance of the above calibre being supplied, as per Extract Minutes of Consultation No. 1727, dated 17th May 1858.

3. The Superintendent Gun Carriage Manufactory has been instructed to make up two more Transport Carriages for the conveyance of 68-pounders, adopting the alteration suggested by the Select Committee in their construction.

Orders of Government on Article 796.—Sanctioned.

ARTICLE 797.

ON THE FAILURE OF THE SIDE FRAMES OF TWO AMMUNITION WAGGONS WITH THE C. COMPANY 2ND BATTALION ARTILLERY.

The undermentioned Report and correspondence relative to the above failure are laid before the Committee for their opinion, by order of the Brigadier Commandant of Artillery.

[a.] No. 411,
21st September 1858.

1. *Letter^[a] from the Officer Commanding C. Company 2nd Battalion Artillery to the Director Artillery Depot.*—Reports the side frames of two Waggon bodies having snapped across exactly in the same place, viz. immediately over the axle, where there is a screw perforation, fixing the cross centre frame; the wood in both cases quite sound, and the fracture short and nearly straight across. One Waggon broke down on the march, and the other at Exercise. From the framing of two Waggon giving way at the same place, it might be inferred that the scantling over the axle is too slight.

[b.] No. 347,
24th September 1858.

2. *Letter^[b] from the Director Artillery Depot to the Officer Commanding C. Company 2nd Battalion Artillery.*—Requesting he will be good enough to notify the year of construction of the Ammunition Waggon, and state particularly whether the axletree bands extend the whole length of the side framing.

[e.] No. 439,
28th September 1858. 3. *Letter^[c] from the Officer Commanding C. Company 2nd Battalion Artillery to the Director Artillery Depot.*—States that the Waggons are of the Established pattern,* constructed in 1856; the axletree bands extend to about 14 inches behind the axletree beds, where they are met by, and slightly lap over, other iron bands, which extend beyond the side frames, and carry the rear foot boards:—the bands extend the whole length of the side framing in front.

[d.] No. 363,
4th October 1858. 4. *Letter^[d] from the Brigadier Commandant of Artillery to the Inspector General of Ordnance and Magazines.*—Forwards copies of the above letters* from the Officer Commanding C. Company 2nd Battalion Artillery at Bangalore.

[e.] No. 843,
12th October 1858. 5. *Letter^[e] from the Superintendent Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines.*—States, in reply to the above correspondence, that the only cause to which he can attribute the breaking of the side frames is, “that the side band bolts may have got loose by the continual jolts and vibrations in travelling, and by this means the side frames (which have been reported to be of sound timber) were deprived of the additional strength of the side bands which they would otherwise have had if the Bolts were properly tightened.”

[f.] No. 6562,
15th October 1858. 6. *Extract^[f] from the Proceedings of the Inspector General of Ordnance and Magazines.*—Forwards copy of the preceding letter, and requests attention to the remarks of the Superintendent Gun Carriage Manufactory.

OPINION.—The Committee are of opinion that the side frames of the Established pattern Waggon are not of sufficient scantling to bear the leverage caused by the men springing

off and on the WaggonBoxes, they recommend therefore that the scantling of the frame over the axletree be 3 inches deeper than at present, inclusive of half an inch for housing, and that this be gradually sloped away towards the ends of the framing. They would further suggest that the Superintendent of the Gun Carriage Manufactory be authorized to alter a Waggon as above proposed, to be submitted to their inspection prior to coming to a final decision.

Observations of the Inspector General of Ordnance on Article 797.—The Inspector General approves of the suggestions recorded in the opinion of the Select Committee.

Orders of Government on Article 797.—Final decision awaited.

ARTICLE 798.

ON A CARRIAGE FOR AN 8 INCH IRON GUN OF 51 CWT.

[s.] No. 7243,
6th November 1858
with Register of Carriage.

The Inspector General of Ordnance and Magazines requests^[a] that a Carriage constructed for an 8 Inch Iron Gun of 51 Cwt., may be submitted to the Artillery Select Committee, and if approved of as to pattern, that it may be tested and reported on.

OPINION.—The Committee approve of the proposed Carriage, but question the necessity for so much weight and strength.—They recommend that it be put to the severest proof to which new patterns are liable, and then after reducing dimensions, to successive proofs, in order to ascertain the extent to which reduction in weight may safely be carried.

Observations of the Inspector General of Ordnance on Article 798.—The Inspector General approves of the suggestions of the Select Committee, and resquests the early decision of Government to the same being carried out.

Orders of Government on Article 798.—Trial sanctioned as proposed.

MEETING 202.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL P. HAMOND. BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depôt, Saint Thomas' Mount, 15th December 1858.

PRESENT.

COLONEL J. W. CROGGAN, *Commanding 5th Battalion Artillery.*
 LIEUT.-COL. G. W. Y. SIMPSON, *Acting Principal Commissary of Ordnance.*
 LIEUT.-COL. G. BRIGGS, *Acting Director Artillery Depot.*
 LIEUT.-COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 MAJOR G. ROWLANDSON, *Acting Superintendent Gun Powder Manufactory.*
 MAJOR B. W. BLACK, *Assistant Adjutant General of Artillery.*
 LIEUTENANT W. D. FORSTER, *5th Battalion Artillery.*

ARTICLE 799.

ON ELEVATING SCREWS IN PRESENT USE WITH LIGHT FIELD CARRIAGES,—IN CONTINUATION OF ARTICLE 788, MEETING 198 DATED 26TH MAY 1858.*

The undermentioned correspondence on this subject is laid before the Committee by order of the Brigadier Commandant of Artillery.

- (a.) No. 367.
 6th October 1858.
1. *Letter^(a) from the Secretary Artillery Select Committee to the Officer Commanding A. Troop Madras Horse Artillery.*

“ The Artillery Select Committee having been ordered
 “ under instructions from His Excellency the Commander-
 “ in-Chief to consider the subject of fixed and Capstan-head
 “ Elevating Screws, in consequence of an opinion expressed
 “ by Brigadier Miller (dated Camp Logassie, 11th April
 “ 1858) to General Whitlock on the subject, I am directed
 “ to request that you will be good enough, as soon as possi-
 “ ble, to afford a full explanation of *all* the circumstances
 “ which in any way occasioned the delay in opening fire from

* Artillery Records page 671.

“ the Guns of the Troop under your command, on the
“ previous day.”

(b.) No. 219.
2nd November 1858. *2. Letter^(b) from the Officer Com-
manding A. Troop Madras Horse Artillery
to the Director Artillery Depôt.*—In reply to the above letter
submits :—

I. “ As far as my recollection carries me, the Elevating
“ Screws were down when my Troop came into Action at
“ Jheejun on the 10th of April last, and some little delay
“ arose in running the screws up.”

2. “ The spot in which the Guns were brought into
“ Action was very confined, dry brushwood and long dry
“ grass, so additional time may have been lost in moving
“ two or three guns to positions, so as to prevent the grass
“ taking fire from the explosion ; also the line of fire inter-
“ cepted by trees and the houses in the village, after un-
“ limbering obliged to move a Gun to right or left, bushes,
“ trees, or broken ground in the way of the draught horses.”

II. “ The Elevating Screws of the Guns of my Troop
“ invariably run down after firing (the Howitzers more so
“ than the Guns) unless a loop be passed over one of the
“ horns of the cap square of the Screw ; sometimes this
“ cannot be done without disturbing the Elevation.”

III. “ At a trot or gallop I have known these Stopper
“ loops to slip off and the Elevating Screw run down.”

IV. “ I do not think the Elevating Screws of my Bat-
“ tery are at all loose.”

OPINION.—With reference to Article 788, Meeting 198,*
the Secretary brings to notice that in
* Artillery Records,
page 671.
accordance with the Committee's desire,
a letter was addressed to the Officer Commanding A. Troop
Horse Artillery, calling for all particulars connected with
the alleged failure of Capstan-head Elevating Screws, at the
skirmish of Jheejun.

2. That Officer's reply clearly indicates that to other causes besides the Elevating Screw, may be attributed the delay of the Troop coming into Action on the occasion in question, and that the Screws were apparently designedly

down with reference to the Regulations as per margin. The alleged faulty construction of the Capstan headed Screws, instanced as being the only cause of such delay, therefore falls to the ground, and with it as a consequence, the necessity for any alteration in the present principle of construction.

3. Since their last Meeting upon this question, the Committee have ascertained that the use of the Capstan-head Elevating Screw obtains exclusively in the French Service from Heavy to Mountain Train Ordnance.

N. B. The Regulation noted in the margin refers exclusively to ordinary marching, and was never intended to apply to the case of a Battery in the presence of an enemy,

ARTICLE 800.

ON A PROPOSED ALTERATION IN THE ELEVATING SCREWS OF 8 INCH MORTARS.

(a.) Dated
29th November 1858. A letter^(a) from Lieutenant-Colonel R. C. Moore, C. B., Commanding Madras Artillery Hyderabad Subsidiary Force, proposing an alteration in the Elevating Screws of 8 Inch Mortars, with the view of their admitting of lower elevation being given, is laid before the Select Committee by order of the Brigadier Commandant of Artillery.

Extract from letter^(a) from Lieutenant-Colonel R. C. Moore, C. B., Commanding Madras Artillery Hyderabad Subsidiary Force.—"I beg leave to submit the following alterations for the consideration of the Brigadier Commandant of Artillery :"—

“ That the thickness of the lower coin be reduced
 “ one-third, and a semi-circular portion of the front
 “ transom, rather in excess of the diameter of the Elevating
 “ Screw, be cut away so as to allow of a longer elevating
 “ screw being made use of.”

“ That the mushroom top of the elevating screw be cut
 “ off square in order to permit of the wrench being applied
 “ higher up.”

“ As the screw in consequence of these alterations would
 “ require to be lengthened, it might be advisable slightly to
 “ increase its diameter.”

OPINION.—The Committee consider that the reduction of the Quoin would leave too shallow a support for the screw ;— the Quoin so reduced would not stand the shock of the firing, and the alteration could scarcely be carried out in the existing beds in the Service :—For these reasons, although the Committee concur with Colonel Moore in the desirableness of the proposed object, they do not feel at liberty to recommend the mode suggested. In case of necessity, the elevating screw can be taken out and the Mortar let down upon the Quoin, by which an elevation of about 32° can be obtained, and should the Mortar still require depressing it can be effected by the simple expedient of unscrewing two nuts, and so converting a fixed into a moveable Quoin.

Observations of the Inspector General of Ordnance on Article 800.—The Inspector General concurs in the opinion expressed by the Committee on the above Article.

ARTICLE 801.

ON A TABLE OF DIMENSIONS OF ALL ORDNANCE FOR THE
 THREE PRESIDENCIES.

The Inspector General of Ordnance and Magazines re-
 (a.) No. 8038, requests^(a) the submission of the undermen-
 dated tioned papers for the consideration of the
 3rd December 1858.

Select Committee, on the subject of a Table of Dimensions of all Ordnance for the three Presidencies.

(b.) No. 6162,
dated
Fort William,
4th November 1858. 1. *Letter^(b) from the Inspector General of Ordnance and Magazines Fort William, to the Inspector General of Ordnance and Magazines Fort Saint George.*

(c.) No. 36,
dated
Meerut,
6th August 1858. 2. *Letter^(c) from the Secretary Bengal Artillery Select Committee, Meerut, to the Inspector General of Ordnance and Magazines Fort William.*—Forwarding a Memo. by the Select Committee on the subject of a Table of Ordnance, suggested by the Madras Military Board to be adopted in the three Presidencies.

(d.) No. 4290,
dated
21st November 1858. 3. *Letter^(d) from the Secretary Military Board Madras, to the Inspector General of Ordnance and Magazines Fort William.*

(e.) No. 6023,
dated
6th December 1856. 4. *Letter^(e) from the Inspector General of Ordnance and Magazines Fort William, to the Secretary Military Board Madras.*

OPINION.—The Committee finding that the question determining the true diameters of Shot, Shells and Gauges, and also the diameters of all classes of Guns, Howitzers and Mortars was very fully investigated in the years 1854 and 1855, and recorded in the Office of the Artillery Depôt is of opinion, that after circulating the Tables for the information and remarks of the Committee, they should be printed and submitted to the Artilleries of Bengal and Bombay, with the view to the promulgation of authoritative instructions on this important subject.

Observations of the Inspector General of Ordnance on Article 801.—The Inspector General approves of the suggestions offered by the Committee.

EXPERIMENT No. 2.

Range from an Iron Gomer Mortar exactly 8 Inches diameter weighing 8 cwt. 1 qr. 13 lbs. with an Iron Ball weighing 67 lbs. 10 ozs. 8 drs. and measuring 7.92 inches diameter. Weight of Eprouvette Gun 2 Qrs. 27 lbs. 10 ozs. Length of Pendulum from the centre of Gun's bore to the point of oscillation 2 feet 7.46 inches.

10th May 1859.—5 o'clock A. M.									
Time.		No. of Rounds.		Nature of Ordnance.		Charge of Powder.		Weight of Ball.	

* These are not included in estimating the mean ; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 2 (Continued.)

11th May 1859, —5 o'clock A. M.										Time.
										No. of Rounds.
										Nature of Ordnance.
										Charge of Powder.
										Weight of Ball.
										Quality of Powder.
										Where Manufactured.
										Range.
										Mean.
										Greatest.
										Least.
										Thermometer.
										Barometer.
										Hygrometer.
										Remarks.
										Weather fine, Moderate West Wind, Line of fire N.
										Weather fine, Westerly breeze, Line of fire N.

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 3.

Fuzes with the Powder of each Manufactory, and the following composition viz. Sulphur 9 parts, Mealed Powder 17 parts, and Saltpetre 15 parts being driven were found to burn, as stated in the annexed Table.

The Fuzes were 13 inch, and one ladle full of composition weighed one drachm avoirdupois, and received 21 strokes with a mallet weighing 2 lbs. 1 oz.

Time. 17th May 1859.	Quality of Powder. Ordnance. 8 Inches.	Length of Fuzes. 8 Inches.	No. of Fuzes.	Time of burning.			Thermometer.	Barometer.	Hygrometer.	Remarks.
				Bengal.	Madras.	Bombay.				
				seconds.	seconds.	seconds.	degrees.	inches.	degrees.	
			1	44	37½	38	Before experiment 84.30 After experiment 86.30	Before experiment 28.639 After experiment 28.639	Before experiment 65.85 After experiment 65.30	Proof carried on between 6 and 7 o'clock A. M.
			2	42	38	36½				
			3	44	37	38				
			4	44	38½	38½				
			5	44½	37	37				

EXPERIMENT No. 4.

Steel balls .68 in. diameter were fired from a Percussion Musket barrel against Mangoe planks ½ inch thick, placed in a frame at 30 feet from Muzzle, the Planks one inch apart. Result as follows.

Time.	No. of Rounds.	Charge of Powder.	Quality of Powder.	Where Manufactured.	No. of Planks penetrated.	Mean.	Greatest.	Least.	Remarks.
18th May 1859.	1	4½ drams.	Musketry	Bengal	20	20	21	19	Fine Weather.
	2				20				
	3				*21				
	4				20				
	5				*19				
	1			Madras	17	16½	19	16	
	2				*19				
	3				*18				
	4				16				
	5				16				
	1			Bombay	*20	21	21	19	
	2				21				
	3				*19				
	4				21				
	5				21				

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 5.

Trains of 50 lbs. each (weighed) from each Manufactory were tried and burnt as follows.

17th May 1859 between 5 & 7 o'clock A. M.		Time.		Time of burning.						Remarks.		
Musketry.	Ordnance.	Quality of Powder.		Length of Train.	Breadth of Train.	Bengal.	Madras.	Bombay.	Thermometer.			
		yds.	Ins.								Seconds.	Seconds.	Seconds.	deg.	ins.	deg.
87	2	19	20	17					84.30 After experiment 86.30	28.639 After experiment 28.639	65.85 After experiment 65.30	Bengal Small grey spots clean.
87	2	18	17	15½					Before experiment	Before experiment	Before experiment	Madras Clean, no deposit.
									After experiment	After experiment	After experiment	Bombay Clean, hardly any deposit.
												Bengal Numerous grey specks.
												Madras A few grey specks.
												Bombay A few white specks all very clean.

EXPERIMENT No. 2.

Range from an Iron Gomer Mortar exactly 8 Inches diameter, weighing 8 cwt. 1 qr. 21 lbs. with an Iron Ball weighing 67 lbs. 12 ozs. 8 drs. and measuring 7.95 inches diameter.—Weight of Eprouvette Gun 3 qrs. 1 lb. Length of Pendulum from the centre of Gun's bore to the point of oscillation 2 feet: 7.95 inches.

Time.	No. of Rounds.	Nature of Ordnance.	Charge of Powder.	Weight of Ball.	Quality of Powder.	Where Manufactured.	Range.				Charge 2 ounces Pendulum Eprouvette.				Thermometer.	Barometer.	Hygrometer.	Remarks.
							yards.	yds.	yds.	yds.	Arc.	Mean.	Greatest.	Least.				
11th May 1859.	1	Iron 8 Inch Gomer Mortar.	2 Ounces.	lbs. 67. 12. 8.	Ordnance.	Bengal I. S. H. 11-57 1265 P.	86				21.4				85			Proof commenced at 4 past 5 and ended at 20 minutes past 6 A. M.—Atmosphere serene. More residuum was observed in the Mortar with the Madras than with the Bengal and Bombay Gunpowder.
	2						*77				*21.6				86			
	3						81				21.4							
	4						*76				*21.3							
	5						83				21.4							
	1	Iron 8 Inch Gomer Mortar.	2 Ounces.	lbs. 67. 12. 8.	Ordnance.	Madras Sept. 1857 C. P. Pit 100 lbs. pressed and glazed G. W. Y. S. Supt.	69				*20.8							
	2						70				*21.							
	3						*65	69	70	69	21.6	21.8	21.4					
	4						*65				21.4							
	5						69				21.8							
	1	Iron 8 Inch Gomer Mortar.	2 Ounces.	lbs. 67. 12. 8.	Ordnance.	Bombay By. O 11 1857	*103				*22.							
	2						*97				22.8							
	3					P. R. 355 feet proved by Capt. Wallace,	94	95	96	94	23.2	23.2	22.8					
	4						96				*22.4							
	5						94				23.							
11th May 1859.	1	Iron 8 Inch Gomer Mortar.	2 Ounces.	lbs. 67. 12. 8.	Ordnance.	Bengal M. I. S. H. 11-57 612. P.	87				25.				85½			Proof commenced at 25 minutes to 5 and ended at 25 minutes to 7 A. M.—Atmosphere serene. There was considerably more residuum on the vent field of the Pendulum Eprouvette with the Madras than with the Bengal and Bombay Gunpowder. Less residuum was observed in the Mortar with the Madras than with the Bengal and Bombay Gunpowder.
	2						84				24.				88			
	3						87	86	87	84	*26.4	24.6	25.	24.	29.87			
	4						*80				25.				29.88			
	5						*75				*26.4							
	1	Iron 8 Inch Gomer Mortar.	2 Ounces.	lbs. 67. 12. 8.	Ordnance.	1 Madras Oct. 1857 M. P. Pit 87 lbs. pressed and glazed G. W. Y. S. Supt.	74				23.2							
	2						*84				23.7							
	3						*70	74	76	72	23.6	23.5	23.7	23.2				
	4						76				*24.3							
	5						72				*24.5							
11th May 1859.	1	Iron 8 Inch Gomer Mortar.	2 Ounces.	lbs. 67. 12. 8.	Ordnance.	Bombay By. M. 11 1857	99				*25.							Proof commenced at 25 minutes to 5 and ended at 25 minutes to 7 A. M.—Atmosphere serene. There was considerably more residuum on the vent field of the Pendulum Eprouvette with the Madras than with the Bengal and Bombay Gunpowder. Less residuum was observed in the Mortar with the Madras than with the Bengal and Bombay Gunpowder.
	2						98				25.9							
	3					P. R. 355 feet proved by Capt. Wallace,	102	100	102	98	25.6	25.9	25.5					
	4						*93				*26.5							
	5						*95				25.5							
	1	Iron 8 Inch Gomer Mortar.	2 Ounces.	lbs. 67. 12. 8.	Ordnance.	Bengal M. I. S. H. 11-57 612. P.	87				25.				85½			
	2						84				24.				88			
	3						87	86	87	84	*26.4	24.6	25.	24.	29.87			
	4						*80				25.				29.88			
	5						*75				*26.4							

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 2 (Continued.)

14th May 1859.					13th May 1859.					12th May 1859.					Time.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	No. of Rounds.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	Nature of Ordnance.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	Charge of Powder.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	Weight of Ball.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	Quality of Powder.
8 Ounces.					4 Ounces.					4 Ounces.					
Ordnance					Ordnance					Ordnance					
Bombay By O 11 1857 P. R. 355 feet proved by Captain Wallace.					Bombay By M. 11 1857 P. R. 359 feet proved by Captain Wallace.					Bombay By O. 11 1857 P. R. 355 feet proved by Capt. Wallace.					
Bengal O I. S. H. 11-57 1265 P					Bengal O I. S. H. 11-57 612 P					Bengal O. I. S. H. 11-57. 1265 P.					
Madras Sept. 1857 C. P. Pit. 100lbs. pressed and glazed G. W. Y. S. Supt.					Madras Oct. 1857 M. P. Pit, 87 lbs. pressed and glazed G. W. Y. S. Superintendent.					Madras Sept. 1857 C. P. Pit 100lbs. pressed and glazed G. W. Y. S. Supt.					
Range.					Range.					Range.					
yards.					yards.					yards.					
Mean.					Mean.					Mean.					
yards.					yards.					yards.					
Greatest.					Greatest.					Greatest.					
yards.					yards.					yards.					
Least.					Least.					Least.					
yards.					yards.					yards.					
Thermometer.					Thermometer.					Thermometer.					
degrees.					degrees.					degrees.					
Barometer.					Barometer.					Barometer.					
inches.					inches.					inches.					
Hygrometer.					Hygrometer.					Hygrometer.					
degrees.					degrees.					degrees.					
Remarks.					Remarks.					Remarks.					
Proof commenced at 10 minutes past 5 and ended at 10 minutes past 6 A. M.— Atmosphere serene.					Proof commenced at 20 minutes past 5 and ended at 4 past 6 A. M.— Morning a little cloudy.					Proof commenced at 10 minutes past 5 and ended at 10 minutes past 6 A. M.— Atmosphere serene.					

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 3.

Fuzes with the Powder of each Manufacture, and the following composition, viz. Sulphur 9 parts—Mealed Powder 17 parts—and Saltpetre 15 parts, being driven, were found to burn as stated in the annexed Table.

The Fuzes were 13 Inch and one ladle full of composition weighed one drachm, avoirdupois, and received 21 strokes with a mallet weighing 2 lbs. 1 oz.

3rd June 1859.	Time.	Ordnance.	Quality of Powder. 8 Inches.	Length of Fuze. No. of Fuze.	Time of burning.			Thermometer.	Barometer.	Hygrometer.	Remarks.
					Bengal.	Madras.	Bombay.				
					seconds.	seconds.	seconds.				
	1				39	37	34½	Before experiment 95 After experiment 95	Before experiment 29.78 After experiment 29.78	Before experiment 86 After experiment 86	
	2				39½	37½	37				
	3				38½	36½	36½				
	4				39½	36	36				
	5				39	36½	36½				

EXPERIMENT No. 4.

Steel balls .68 inch diameter was fired from a Percussion Musket Barrel against Mangoe Planks ¾ inch thick, placed in a frame at 30 feet from Muzzle, the Planks one inch apart. Result as below.

Time.	No. of Rounds.	Charge of Powder.	Quality of Powder.	Where Manufactured.	No. of Planks perforated.	Mean.	Greatest.	Least.	Remarks.
11th May 1859.	1	4½ drams.	Musketry	Bengal	13	13½	14	13	The planks were soaked in water for 24 hours before Proof. The charge of 4½ drams weighed two hours before firing. The musket washed after every five rounds. The same man loaded throughout the Experiment, viz. by pouring the powder through a funnel, and dropping the Ball in.
	2			M.	13				
	3			I. S. H.	*11				
	4			11-57	*11				
	5			612-P.	14				
	1			Madras	*16	14	14	14	
	2			Oct. 1857	14				
	3			M. P. Fit, 87 lbs.	14				
	4			pressed and glazed	*16				
	5			G. W. Y. S. Superintendent.	14				
	1	Bombay	*12	18½	19	18			
	2	By M.	*17						
	3	1857	18						
	4	P. R. 359 feet	19						
	5	proved by Captain Wallace.	19						

* These are not included in estimating the mean ; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 5.

Trains of 50 lbs. each (weighed from each Manufactory) were tried and burnt as follows.

19th May 1859.				Time.		Time of burning.			Remarks.	
Musketry.		Ordnance.		Quality of Powder.		Breadth of Train.	Bengal.	Madras.		Bombay.
				Length of Train.						
				yds.	Ins.					
87		87		2		17 $\frac{3}{4}$	18 $\frac{3}{4}$	15 $\frac{3}{4}$	Commenced at 10 minutes to 6 and ended at 7 o'clock A. M.—Atmosphere serene.	
2		2		16	16 $\frac{3}{4}$	14 $\frac{1}{2}$				
				Before experiment.. ..		84	Thermometer.			
				After experiment		88	Barometer.			
				Before experiment.. ..		29.90	Hygrometer.			
				After experiment		29.92				
				Before experiment.. ..		83				
				After experiment		85				
Ordnance.		Flame.		Sparks.		Smoke marks.		Residuum.		Remarks.
Bengal		Clear and bright.		None.		From 6 to 19 inches on each side of Train.		No residuum or Beads.		
Madras		"		"		From 7 to 18 inches.		"		
Bombay		"		"		From 6 to 18 inches.		"		
Musketry.		Bengal.		Clear and bright.		None.		From 5 to 16 inches on each side of Train.		No residuum or Beads.
Madras.		"		"		"		From 8 to 19 inches.		
Bombay.		"		"		"		From 7 to 18 inches.		

ABSTRACT OF HOT WEATHER COMPARATIVE POWDER PROOF.

[illegible]

BOMBAY HOT WEATHER PROOF OF 1859.

Report of Experiments, to ascertain the comparative Qualities of Gunpowder from the Manufactories of Bengal, Madras and Bombay

EXPERIMENT No. I.

As to Color, Size and Hardness of Grain, Density and Freedom from Dust.

Time.	Where manu- factured.	Quality.	Marks on Barrels.	When made	Color.	Size of Grain.	Hardness of Grain.	Density.	Freedom from Dust.	Remarks.	
Between 6.15 a. m. and 9 a. m., 16th April 1859.	Bengal.	Ordnance.	O. S. H. 12-57 1638 P.	1857.	black	2 lbs. of Ordnance and 2 of Musketry of each manufacture were sifted in a No. 1 (or 576 mesh) sieve, and left the following quantities which would not pass through.	Half a pound of each manufacture that did not pass through a 576 mesh sieve was then meal for one minute and the following quantities remained in or passed through a fine lawn sieve.	Weight contain- ed in measure 3.5 In. Diameter and 3.5 In. high.	Free.	Fine clear morning.	
						lbs. oz. drs.	lbs. oz. drs.	lbs. oz. drs.			lbs. oz. drs.
	Madras.	Ordnance.	Madras Sept. 1857 C. P. Pit 100 lbs. pressed and glazed G. W. Y. S. Supt.	1857.	black	Ordnance.	Ordnance.	Ordnance.	Ordnance.	Free.	
						2 lbs. of Ordnance and 2 of Musketry of each manufacture were sifted in a No. 1 (or 576 mesh) sieve, and left the following quantities which would not pass through.	Half a pound of each manufacture that did not pass through a 576 mesh sieve was then meal for one minute and the following quantities remained in or passed through a fine lawn sieve.	Weight contain- ed in measure 3.5 In. Diameter and 3.5 In. high.	lbs. oz. drs.		
	Bombay.	Musketry.	Bombay O 11 P. R. 368½ feet. Proved by Lieut. T. T. Haggard.	1857.	black	Bombay, 2 lbs. sifted left	Bombay, 2 lbs. sifted left	Bombay, 2 lbs. sifted left	Bombay, 2 lbs. sifted left	Free.	
						Ordnance.	Ordnance.	Ordnance.	Ordnance.		

EXPERIMENT No. 2.

Range from an Iron Gomer Mortar exactly 8 Inches diameter, weighing 8 cwt. 2 gr. 0 lbs. with an Iron Ball weighing 68 lbs. and measuring 7.96 inches diameter.—Weight of Eprouvette Gun 3 qrs 16 lbs. Length of Pendulum from the centre of Gun's bore to the point of oscillation 2 feet 1½ inches.

Between 4.30 and 6 p. m., 11th April 1859.	Between 4.30 and 6 p. m., 8th April 1859.	No. of Rounds.	Nature of Ordnance.	Charge of Powder.	Weight of Ball.	Quality of Powder.	Where Manufactured.	Charge 2 ounces Pendulum Eprouvette.				Thermometer.	Barometer.	Hygrometer.	Remarks.
								Range.	Mean.	Greatest.	Least.				
								yards.	yds.	yds.	yds.	Arc.	Mean.	Greatest.	Least.
Between 4.30 and 6 p. m., 11th April 1859.	8 Inch Mortar. 2 Ounces. 68 lbs.	1 2 3 4 5 6 7 8 9 10 11 12	Ordnance.												
Between 4.30 and 6 p. m., 11th April 1859.	8 Inch Mortar. 2 Ounces. 68 lbs.	1 2 3 4 5 6 7 8 9 10 11 12	Musketry.												
Between 4.30 and 6 p. m., 11th April 1859.	8 Inch Mortar. 2 Ounces. 68 lbs.	1 2 3 4 5 6 7 8 9 10 11 12	Musketry.												

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 2 (Continued.)

Between 5 and 6 20 p. m., 13th April 1859.										Between 3 and 6 p. m., 12th April 1859.										Time.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	No. of Rounds.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	Nature of Ordnance.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	Charge of Powder.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	Weight of Ball.
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	Quality of Powder.
8 Ounces.										4 Ounces.										Where Manufactured.
8 Inch Mortar.										Ordnance.										
68 lbs.										Musketry.										
Ordnance																				
Bengal										Bengal										
Bengal										Bengal										
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Bengal										Bengal										

EXPERIMENT No. 2. (Continued.)

Between 5 and 6 p. m., 14th April 1859. Time.				No. of Rounds.		Nature of Ordnance.	Charge of Powder.	Weight of Ball.	Quality of Powder.	Where manufactured.	Range.	Mean.	Greatest.	Least.	Thermometer.	Barometer.	Hygrometer.	Remarks.
5	4	3	2	1	0						yards.	yards.	yards.	yards.	degrees.	inches.	degrees.	
5	4	3	2	1	0	8 Ounces				Bengal	396 *380 398 *390 400	398	400	380	Before experiment 88.6 After experiment 86.0	Before experiment 29.753 After experiment 29.769	Before experiment 78.5 After experiment 78.0	Bright warm afternoon.
5	4	3	2	1	0					Madras	343 *337 *339 343 341	342	343	337	Before experiment After experiment	Before experiment After experiment	Before experiment After experiment	
5	4	3	2	1	0					Bombay	*432 455 441 450 *467	448	467	432	Before experiment After experiment	Before experiment After experiment	Before experiment After experiment	
5	4	3	2	1	0													

The proving ground does not afford sufficient range for the proof with 1 lb. charge.

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 3.

Fuzes with Powder of each Manufactory and the following composition, viz., Sulphur 9 parts—Mealed Powder 17 parts—and Saltpetre 15 parts, being driven, were found to burn as stated in the annexed Table.

The Fuzes were 13 inch and one ladle full of composition weighed one drachm, avoirdupois and received 21 strokes with a mallet weighing 2 lbs. 1 oz.

Between 3 and 4 p. m., 19th April 1859.					Time.	Quality of Powder.			No. of Fuzes.	Time of burning.			Thermometer.	Barometer.	Hygrometer.	Remarks.
Ordnance.					Length of Fuzes.											
8 Inches.						Bengal.	Madras.	Bombay.								
					seconds.	seconds.	seconds.				degrees.	inches.	degrees.			
1	44	35	38													
2	44	35	39													
3	43	35	40													
4	43	36	39													
5	43	36	39													
Before experiment 90.6																
After experiment 89.6																
Before experiment 29.771																
After experiment 29.763																
Before experiment 77.6																
After experiment 78.2																
Clear warm afternoon, wind N. N. E.																

EXPERIMENT No. 4.

Steel balls .68 inch diameter were fired from a Percussion Musket Barrel against Mangoe Planks $\frac{1}{2}$ inch thick, placed in a frame at 30 feet from Muzzle, the Planks one inch apart. Result as below.

Time.	No. of Rounds.	Charge of Powder.	Quality of Powder.	Where Manufactured.	No. of Planks penetrated.	Mean.	Greatest.	Least.	Remarks	
Between 5 and 6 p. m., 18th April 1859.	1	4½ drams.	Musketry	Bengal.	30	30	30	29	This Experiment was carried out in strict accordance with the instructions contained in letter No. 4865 dated 9th January 1849 from the Bengal Military Board, nearly all the balls that passed through the 30th plank made deep indentations in the thick block placed behind all.	
	2				30					
	3				30					
	4				*29					
	5				*30					
	1			Madras.	30	29	30	28		
	2				*28					
	3				30					
	4				29					
	5				*29					
	1			Bombay.	30	30	30	29		
	2				30					
	3				*29					
	4				30					
5	*30									

* These are not included in estimating the mean ; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 5.

Trains of 50 lbs. each (weighed from each Manufactory) were tried and burnt as follows.

Between 5 & 6 p. m., 19th April 1859.		Time.	
Musketry.	Ordnance.	Quality of Powder.	
		yds.	Ins.
87	2	87	2
		Breadth of Train.	
12	12	15	
12	17		
12	13		
		Time of burning.	
		Bengal.	
		Madras.	
		Bombay.	
		Thermometer.	
		Barometer.	
		Hygrometer.	
Before experiment. 86.9			
After experiment 84.5			
Before experiment. 29.758			
After experiment 29.776			
Before experiment. 77.5			
After experiment 77.0			
Remarks.			
Clear warm afternoon strong breeze from N. N. E.			

(Signed) **J. WORGAN Major,**
Actg. Agent for Gun Carriages.

(Signed) **A. ROWLAND Colonel,**
Commandant of Arty. and President.

(Signed) **J. B. WOOSNAM Lieutenant Colonel,**
Actg. Prnt. Comy. of Ord. & Agent for Gun Powder.

(Signed) **J. M. GLASSE Lieutenant Colonel,**
Actg. Inspector General of Ordnance and Magazines.

BENGAL WET WEATHER PROOF
Report of Experiments, to ascertain the comparative Qualities of Gunpowder from the Manufactories of Bengal, Madras and Bombay.

EXPERIMENT No. I.

Sixty pounds of Powder of each Manufacture were taken by weight, and exposed to the sun, between 10 and 12 for 14 hours, from 10½ o'clock to 12 o'clock. Thermometer before the experiment standing in an open shed at 89°-30' after it at 92°. Barometer before the experiment 28.9. after it 28.9. The several quantities were then again weighed and gave as follows.

	lbs.	oz.	dr.
Ordnance.....	59	12	0
Musketry.....	59	11	14

	lbs.	oz.	dr.
Madras.	59	11	6
Bombay.	59	13	10

Quantities of 2, 4, and 8 Ounces, and 20 lbs. weight were then laid out on flat trays, and exposed for 12 days in a room having one verandah and the doors thrown open, result as below.

Time.	Quality.	Where and when manufactured and Marks on Barrels.	Weight dry.	Weight after exposure.	Thickness of Powder spread on Trays.	Remarks.	No. of days.	State of the Thermometer.				State of the Barometer.				State of the Hygro- meter.				General appearance at different periods during the exposure.	
			lbs.	oz.	dr.			At Sun.	At Noon.	At Rise.	At Sun.	At Noon.	At Rise.	At Sun.	At Noon.	At Rise.					
3 P. M. 16th till 28th August 1859.	Ordnance.	Bengal O. I. S. H. 12-57 20-59.	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Atmosphere clear. do. do. Rain with light wind from 3 to 5 A. M. Atmosphere damp and cloudy. Strong westerly wind sun bright. Light do. and cloudy. South westerly wind and bright sun. South westerly wind do. Light E. -ly wind atmosphere cloudy and variable. Strong E. -ly wind, heavy rain from 4 past 10 till noon, remainder of the day cloudy and variable. Strong southerly wind heavy rain from 3 to 7 P. M. night damp and cloudy.		
		0	4	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0			
		0	8	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0			
		20	0	20	1	2	0	0	0	0	0	0	0	0	0	0	0	0			
		Madras September 18-57 C. P. Pitt 100 lbs. G. W. Y. S. Supt.	0	2	0	0	14	0	0	0	0	0	0	0	0	0	0	0		0	
		0	4	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0		0	
		0	8	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0		0	
		20	0	20	1	8	0	0	0	0	0	0	0	0	0	0	0	0		0	
		Bombay O. I. S. H. 11-57 920. F.	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0		0	
		0	4	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0		0	
		0	8	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0		0	
		20	0	20	1	10	0	0	0	0	0	0	0	0	0	0	0	0		0	
3 P. M. 16th till 28th August 1859.	Musketry.	Madras October 1-57 C. P. Pitt 100 lbs. G. W. Y. S. Supt.	0	2	0	0	14	0	0	0	0	0	0	0	0	0	0	0	Atmosphere clear. do. do. Rain with light wind from 3 to 5 A. M. Atmosphere damp and cloudy. Strong westerly wind sun bright. Light do. and cloudy. South westerly wind and bright sun. South westerly wind do. Light E. -ly wind atmosphere cloudy and variable. Strong E. -ly wind, heavy rain from 4 past 10 till noon, remainder of the day cloudy and variable. Strong southerly wind heavy rain from 3 to 7 P. M. night damp and cloudy.		
		0	4	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0			
		0	8	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0			
		20	0	20	1	12	0	0	0	0	0	0	0	0	0	0	0	0			
		Bombay M. I. S. H. 11-57 920. F.	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0		0	
		0	4	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0		0	
		0	8	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0		0	
		20	0	20	1	10	0	0	0	0	0	0	0	0	0	0	0	0		0	
			0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0		0	
			0	4	0	4	2	0	0	0	0	0	0	0	0	0	0	0		0	0
			0	8	0	8	2	0	0	0	0	0	0	0	0	0	0	0		0	0
			20	0	20	1	11	0	0	0	0	0	0	0	0	0	0	0		0	0

EXPERIMENT No. 2.

Range from an Iron Gomer Mortar exactly 8 Inches diameter, weighing 8.cwt. 0 qr. 10 lbs. mounted on an Iron Bed weighing 12 cwt. 1 qrs. 11 lbs. with an Iron Ball weighing 68 lbs. and measuring 7.94 inches diameter.—Weight of the Eprouvette Gun 3 qrs $\frac{1}{8}$ lbs. Length of Pendulum from centre of Gun's bore to the point of oscillation 2 feet 8 inches.

30th August 1859 between 10 and 11 a. m.										29th August 1859 between 10 and 11 a. m.										Time.									
																				No. of Rounds.									
																				Nature of Ordnance.									
																				Charge of Powder.									
																				Weight of Ball.									
																				Quality of Powder.									
																				Where & when Manufactured.									
																				Charge 2 ounces Pendulum Eprouvette.									

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

EXPERIMENT No. 3.

Steel balls .68 inch diameter were fired from a Percussion Musket Barrel, against Mangoe Planks $\frac{1}{2}$ inch thick, placed in a frame at 30 feet from the Muzzle, the Planks one inch apart. Result as below.

31st August 1859 between 11 and 12 a. m.		Time.	No. of Rounds.	Charge of Powder.	Quality of Powder.	Where & when Manufactured.	No. of Planks pene- trated.	Mean.	Greatest.	Least.	Remarks
1	2	3	4	5	4½ drams. Musketry	Bengal.	*13	17	20	13	Cloudy and cool.
2	3	4	5	*20							
3	4	5	20								
4	5	13									
5	18										
1	2	3	4	5		Madras.	15	15½	18	10	
2	3	4	5	15							
3	4	5	*10								
4	5	17									
5	*18										
1	2	3	4	5		Bombay.	*18	18½	21	18	
2	3	4	5	*21							
3	4	5	18								
4	5	18									
5	20										

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

[illegible]

Saint Thomas' Mount 29th November 1859.

EXPERIMENT No. I.

Sixty pounds of Powder of each Manufacture were taken by weight, and exposed to the sun, between 1 and 4 P. M. for 1½ hours, viz. from 1 o'clock to 2½ o'clock. The thermometer before the experiment standing in an open shed at 81°. Barometer before the experiment 29.90, after it 29.85. The several quantities were then again weighed and gave as follows.

	Bengal.		Madras.		Bombay.	
	lbs.	dr. oz.	lbs.	oz.	lbs.	oz.
Ordinance.....	59	10	59	12	59	15
Musketry.....	59	11	59	15	59	14
Artillery.....	59	10	59	15	59	14
Engineers.....	59	11	59	15	59	14
Medical.....	59	10	59	12	59	15
Transport.....	59	11	59	15	59	14
Commissariat.....	59	10	59	12	59	15
Police.....	59	11	59	15	59	14
Public Works.....	59	10	59	12	59	15
Revenue.....	59	11	59	15	59	14
Education.....	59	10	59	12	59	15
Public Health.....	59	11	59	15	59	14
Public Safety.....	59	10	59	12	59	15
Public Amusement.....	59	11	59	15	59	14
Public Instruction.....	59	10	59	12	59	15
Public Works.....	59	11	59	15	59	14
Public Health.....	59	10	59	12	59	15
Public Safety.....	59	11	59	15	59	14
Public Amusement.....	59	10	59	12	59	15
Public Instruction.....	59	11	59	15	59	14
Public Works.....	59	10	59	12	59	15
Public Health.....	59	11	59	15	59	14
Public Safety.....	59	10	59	12	59	15
Public Amusement.....	59	11	59	15	59	14
Public Instruction.....	59	10	59	12	59	15
Public Works.....	59	11	59	15	59	14
Public Health.....	59	10	59	12	59	15
Public Safety.....	59	11	59	15	59	14
Public Amusement.....	59	10	59	12	59	15
Public Instruction.....	59	11	59	15	59	14
Public Works.....	59	10	59	12	59	15
Public Health.....	59	11	59	15	59	14
Public Safety.....	59	10	59	12	59	15
Public Amusement.....	59	11	59	15	59	14
Public Instruction.....	59	10	59	12	59	15
Public Works.....	59	11	59	15	59	14
Public Health.....	59	10	59	12	59	15
Public Safety.....	59	11	59	15	59	14
Public Amusement.....	59	10	59	12	59	15
Public Instruction.....	59	11	59	15	59	14
Public Works.....	59	10	59	12	59	15
Public Health.....	59	11	59	15	59	14
Public Safety.....	59	10	59	12	59	15
Public Amusement.....	59	11	59	15	59	14
Public Instruction.....	59	10	59	12	59	15
Public Works.....	59	11	59	15	59	14
Public Health.....	59	10	59	12	59	15
Public Safety.....	59	11	59	15	59	14
Public Amusement.....	59	10	59	12	59	15
Public Instruction.....	59	11	59	15	59	14
Public Works.....	59	10	59	12	59	15
Public Health.....	59	11	59	15	59	14
Public Safety.....	59	10	59	12	59	15
Public Amusement.....	59	11	59	15	59	14
Public Instruction.....	59	10	59	12	59	15
Public Works.....	59	11	59	15	59	14
Public Health.....	59	10	59	12	59	15
Public Safety.....	59	11	59	15	59	14
Public Amusement.....	59	10	59	12	59	15
Public Instruction.....	59	11	59	15	59	14
Public Works.....	59	10	59	12	59	15
Public Health.....	59	11	59	15	59	14
Public Safety.....	59	10	59	12	59	15
Public Amusement.....	59	11	59	15	59	14
Public Instruction.....	59	10	59	12	59	15
Public Works.....	59	11	59	15	59	14
Public Health.....	59	10	59	12	59	15
Public Safety.....	59	11	59	15	59	14
Public Amusement.....	59	10	59	12	59	15
Public Instruction.....	59	11	59	15	59	14
Public Works.....	59	10	59	12	59	15
Public Health						

Quantities of 2, 4, and 8 Ounces, and 20 lbs. weight were laid out on flat trays, and exposed for 12 days in a room having one verandah and the doors thrown open. Result as below.

Where and when manufactured.	Weight dry.	Weight after exposure.	Thickness of Powder spread on Trays.	Remarks.	No. of days.	Thermometer.	Barometer.	Thermometer attached.	Dry Bulb.	Wet Bulb.	Hygrometer.	General appearance at different periods during exposure.
	lbs. oz.	lbs. oz.	dr.			At Sun. Rise.	At Sun. Noon.	At Sun. Set.	At Sun. Rise.	At Sun. Noon.	At Sun. Set.	
Bengal O. I. S. H. 12.57 2.42.	0 2 0 4 0 8 20 0	2 0 4 0 8 2 20 0	1 1 2 1 10 10			81 81 81 81	83 83 83 83	29.98 29.99 30.04 29.98	80 85 83 80	81 86 84 81	83 83 84 83	
Madras No. 22 September 1857 C. P. Pitt 91 lbs. pressed and glazed G. W. Y. S. Supt.	0 2 0 4 0 8 20 0	2 0 4 0 8 4 20 0	14 1 1 1 12 12			81 81 81 81	83 83 83 83	29.98 29.99 30.04 29.98	80 85 83 80	81 86 84 81	83 83 84 83	
Bombay O 11 P. 355 feet Pd. by Capt. Wallace.	0 2 0 4 0 8 20 0	2 0 4 0 8 2 20 0	1 1 2 1 10 10			81 81 81 81	83 83 83 83	29.98 29.99 30.04 29.98	80 85 83 80	81 86 84 81	83 83 84 83	
Bengal M. I. S. H. 11.1837 836.	0 2 0 4 0 8 20 0	2 0 4 0 8 2 20 0	1 1 2 1 10 10			81 81 81 81	83 83 83 83	29.98 29.99 30.04 29.98	80 85 83 80	81 86 84 81	83 83 84 83	
Madras No. 27. October 1857 M. P. Pitt 100 lbs. pressed and glazed. G. W. Y. S. Supt.	0 2 0 4 0 8 20 0	2 0 4 0 8 2 20 0	1 1 2 1 10 10			81 81 81 81	83 83 83 83	29.98 29.99 30.04 29.98	80 85 83 80	81 86 84 81	83 83 84 83	
Bombay M. 1187 P. R. 355 feet Pd. by Capt. Wallace.	0 2 0 4 0 8 20 0	2 0 4 0 8 2 20 0	1 1 2 1 10 10			81 81 81 81	83 83 83 83	29.98 29.99 30.04 29.98	80 85 83 80	81 86 84 81	83 83 84 83	

EXPERIMENT No. 2.

Ranges from an Iron Gomer Mortar exactly 8 Inches diameter, weighing 8 cwt. 1 qr. 21 lbs. mounted on an Iron Bed weighing 12 cwt. 2 qrs. 0 lbs. with an Iron Ball weighing 67 lbs. 11 ozs. 4 drs. and measuring 7.95 inches diameter.—Weight of the Eprouvette Gun 3 qrs 1 lbs. Length of Pendulum from centre of Gun's bore to the point of oscillation 2 feet 7.65 inches.

23rd November 1859.		21st November 1859.		Time.		No. of Rounds.		Nature of Ordnance.		Charge of Powder.		Weight of Ball.		Quality of Powder.		Where & when Manufactured.		Charge 2 ounces Pendulum Eprouvette.												Thermometer.		Remarks.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

In conducting these Proofs, the Ball was let down gently into the Mortar; the Mortar was washed after every 5 rounds, the charges weighed 2 hours before firing, and the same men loaded the Mortar and Eprouvette throughout the Proof.

EXPERIMENT No. 3.

Steel ball .68 inch diameter was fired from a Percussion Musket barrel, against Mangoe Planks $\frac{1}{4}$ inch thick, placed in a frame at 30 feet from the Muzzle, the Planks one inch apart.— Result as below.

Time.	No. of Rounds.	Charge of Powder.	Quality of Powder.	Where and when Manufactured.	No. of Planks perforated.	Mean.	Greatest.	Least.	Remarks.
23rd November 1859.	1	$\frac{1}{4}$ drams.	Musketry	Bengal M. I. S. H. 11-57 836	12	12	12	12	The planks were soaked in water for 24 hours before Proof. The charge of $\frac{1}{4}$ drams weighed 2 hours before firing. The Musket washed after every five rounds. The same man loaded throughout the experiment, viz. by pouring the powder through a funnel, and dropping the Ball in.
	2				12				
	3				12				
	4				*11				
	5				*11				
	1			Madras No. 27. October 1857 M. P. Pit. 100 lbs. pressed and glazed G. W. Y. S. Supt.	*8	11	11	11	
	2				*10				
	3				11				
	4				11				
	5				11				
	1			Bombay M. 11-17 P. R. 359 feet, proved by Captain Wallace.	*10	11½	12	11	
	2				12				
	3				*10				
	4				11				
	5				11				

* These are not included in estimating the mean; the three rounds approximating closest to each other have been taken to fix the average.

with August 1859. Between 4 and 5 P. M. 9th August 1859. Time.

[illegible]

EXPERIMENT No. 3.

Steel balls .68 inch diameter were fired from a Percussion Musket barrel, against Mango planks $\frac{1}{4}$ inch thick, placed in a frame at 30 feet from the Muzzle, the Planks one inch apart. Result as below.

5 and 6 P. M. 16th August 1859.	Time.	No. of Rounds.	Charge of Powder.	Quality of Powder.	Where and when Manufactured.	No. of Planks penetrated.	Mean.	Greatest.	Least.	Remarks.	
1			4½ drams.	Musketry	Bengal	*24	27½	28	24		
2		*26									
3		28									
4		28									
5		27									
1					Madras	*22	24½	25	22		Cloudy Afternoon.
2		*24									
3		23									
4		25									
5		25									
1					Bombay	*28	29	30	28		
2		29									
3		29									
4		29									
5		*30									

* These are not included in estimating the mean ; the three rounds approximating closest to each other have been taken to fix the average.

ACT OF WET WEATHER COMPARATIVE POWDER PROOF.

No. 1.										No. 2.										No. 3.									
Portions of each man- ufacture laid out on trays and exposed for 12 days in a room having one verandah and the doors thrown open.										8 Inch Gomer Iron Mortar. { Mortar, 8 1 11 Bed, 11 0 20 Ball, 68 Diameter of Ball, 7.95 In. Elevation 45° Established proof with 2 ozs. charge 63 yards.										Epruvette charge 2 ounces. actual. D.M.D.M. 21° 21-10 21-8 21-15									
Weight dry.					Weight after exposure.					State of the Thermometer.					State of the Barometer.					State of the Hygrometer.									
lbs. ozs.					lbs. ozs.					At sunrise.					At noon.					At sunset.									
0 2 0 2-005					0 2 0 2-005					°					ins.					°									
0 4 0 4-01					0 4 0 4-01					°					ins.					°									
0 8 0 8-01					0 8 0 8-01					°					ins.					°									
20 0 20 1					20 0 20 1					°					ins.					°									
0 2 0 2-005					0 2 0 2-005					°					ins.					°									
0 4 0 4-01					0 4 0 4-01					°					ins.					°									
0 8 0 8-0025					0 8 0 8-0025					°					ins.					°									
20 0 20 0					20 0 20 0					°					ins.					°									
178-8 78 8 80-1 29-606 29-611 29-585 79 78 80-3										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5									
979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2									
1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9										1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9										1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9									
1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4										1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4										1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4									
1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77										1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77										1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77									
178-8 78 8 80-1 29-606 29-611 29-585 79 78 80-3										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5									
979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2									
1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9										1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9										1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9									
1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4										1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4										1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4									
1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77										1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77										1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77									
178-8 78 8 80-1 29-606 29-611 29-585 79 78 80-3										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5									
979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2									
1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9										1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9										1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9									
1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4										1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4										1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4									
1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77										1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77										1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77									
178-8 78 8 80-1 29-606 29-611 29-585 79 78 80-3										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5									
979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2									
1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9										1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9										1079-1 85 4 78-9 29-771 29-830 29-805 77-80 76-9									
1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4										1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4										1179-3 85-2 81-5 29-782 29-830 29-804 77-79-2 77-4									
1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77										1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77										1279-1 85-8 81-1 29-803 29-821 29-786 77-79-6 77									
178-8 78 8 80-1 29-606 29-611 29-585 79 78 80-3										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										177-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1										779-5 83 2 80-4 29-678 29-725 29-704 78 77-6 77-1									
878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5										878-6 80 4 79-4 29-675 29-779 29-738 77-3 76-4 76-5									
979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2										979-1 84 4 80-3 29-773 29-816 29-788 77-2 77-2									
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(Signed) J. B. WOOSNAM Lieut. Colonel.
Actg. Principal Comdry. of Ord. and
Agent for Gun Powder,

(Signed) A. ROWLAND Lieut. Colonel,
Comdt. of Arty. and President,

(Signed) M. GLASSE
Comdt. of Ord. and Magazines.

MEETING 203.

EXTRACT FROM THE PROCEEDINGS OF THE PERMANENT ARTILLERY SELECT COMMITTEE, ASSEMBLED BY ORDER OF COLONEL P. HAMOND, BRIGADIER COMMANDANT OF ARTILLERY.*Artillery Depot, Saint Thomas' Mount, 23rd March 1859.***PRESENT.**COLONEL J. W. CROGGAN, *Commanding 5th Battalion Artillery.*LIEUT. COL. G. W. Y. SIMPSON, *Acting Principal Commissary of Ordnance.*LIEUT. COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*LIEUT. COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*LIEUT. COL. G. ROWLANDSON, *Superintendent Gun Powder Manufactory.*MAJOR. B. W. BLACK, *Director Artillery Depot.*CAPTAIN H. W. LUMSDEN, *5th Battalion Artillery.***ARTICLE 802.****ON THE FAILURE OF A PEDDOWK BEAM OF A 9-POUNDER.
CARRIAGE.****ARTICLE 803.****ON CORRUGATED IRON BOATS AND WAGGONS.**

(a.) Extract Proceedings
No. 9017.
4th January 1859. The Inspector General of Ordnance and
Magazines requests^(a) that certain Cor-
rugated Iron Boats and Waggon's may be submitted to the
Select Committee for examination, and states that he is pre-
pared to authorize any experiments that may be desired,
with a view to their trial and final report.

The undermentioned document on the subject is laid
before the Committee.

(b.) No. 4596.
21st December 1859. *Extract^(b) from Minutes of Consulta-
tion of Government.*—Approves of the

Boats and Waggon's being made over to the Ordnance Depart-
ment.—“The Inspector General of Ordnance will provide
“for their being tested in the manner best calculated to prove
“their efficiency and will submit a detailed report of the re-
“sult for the information of Government.”

OPINION.—The Committee recommends that the two float-
ing Metallic Waggon's be completed with a running gear,

such as are described in Major Eyre's Pamphlet, preparatory to a course of Experiments.—It is observed that the two boats are provided with oars and rudders.

Observations of the Inspector General of Ordnance on Article 803.—The Inspector General concurs in the recommendation of the Select Committee to complete the Metallic Waggons with running gear, prior to conducting Experiments.

Orders of Government on Article 803.—Recommendation of the Committee sanctioned.

ARTICLE 804.

ON THE FAILURE OF LIGHT FIELD CARRIAGE AXLETREES.—
IN CONTINUATION OF ARTICLE 771, MEETING 196, DATED
21st DECEMBER 1859.*

(a.) Extract Proceedings
No. 9640.
21st January 1859.

(b.) No. 21.
6th January 1859.

The Inspector General of Ordnance and Magazines requests (a) that a Report (b) of the Superintendent of the Gun Carriage Manufactory on the failure of an Axletree of a 24 Pdr. Howitzer Carriage in use with the A. Company 3rd Battalion Artillery on service in Bengal may be laid before the Artillery Select Committee.—

Extract from letter (b) from the Superintendent Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines.—"this is only another instance of failure in the
"present pattern Axletrees, which I have predicted in
"my last communication No. 1030 dated 17th December
"1858 on this subject, and you will observe that the opinion
"of the Officers of the Naval Brigade, in a Presidency,
"where the subject of bent or straight axles is not under
"discussion, Officers free from any prejudice, and one of
"them possessing a professional knowledge on the subject
"state 'that the iron has originally been excellently
"wrought,' and a person giving such an opinion would no

* Page 621 Artillery Records.

“doubt have stated the quality of the material if it were
“bad.

“This unbiassed opinion fully bears me out, that the
“cause of failure is not in the workmanship or material;
“but,—as I have frequently stated—in the defective princi-
“ple of the construction of the Axletrees, and as Captain
“Cadell states, ‘The frequent breakage of the 24-Pounder
“Axles proves indubitably their want of strength to re-
“sist the concussions which they must receive as Field
“Guns on Field Service.’ I agree with him, and the only
“way of strengthening these axles, is by adopting the prin-
“ciple of bent Arms in their construction which I again
“urge upon your attention.”

OPINION.—The Committee considers it desirable to defer the consideration of this subject until the receipt of a reply, expected to a letter which was addressed in November last to the Superintendent of the Royal Carriage Manufactory at Woolwich.

Observations of the Inspector General of Ordnance on Article 804.—The Inspector General concurs in the opinion of the Committee to defer the consideration of the subject on the grounds stated.

Orders of Government on Article 804.—Reply from Woolwich awaited.

ARTICLE 805.

ON A MADRAS TRAVERSING GUN PLATFORM OF IMPROVED CONSTRUCTION BY LIEUT. COLONEL J. MAITLAND, SUPERINTENDENT GUN CARRIAGE MANUFACTORY, IN COMMUNICATION WITH THE SELECT COMMITTEE.—IN CONTINUATION OF ARTICLE 770, MEETING 193, 21ST DECEMBER 1857.*

The Experimental Traversing Platform having been tested during the annual Artillery Practice at Head Quarters in

1859, with a Heavy Field 24 Pounder Gun, it is submitted for the opinion of the Select Committee by order of the Brigadier Commandant of Artillery.

The undermentioned documents are laid before the Committee.

- (a.) No. 12.
11th January 1859. 1. Letter ^[a] from the Director Artillery Depot to the Officer Commanding Madras Artillery Centre Division.—

Intimating that an experimental traversing platform for a Heavy Field 24-Pounder Gun, of additional scantling would be used at the ensuing Annual Practice, possessing the following peculiarities.

1. "The Platform is provided with spare blocks to give additional slope to diminish recoil."

2. "A Ballard is attached to the end of the trail plank, the rope of which is to be fastened to the Trail of the Carriage when running up after firing.

3. "Angle iron has been used in the groove of the Trail plank, instead of flat iron.

4. "The Trail pin has been made flat underneath."

5. "The wheel planks have recoiling plates of sheet iron $\frac{1}{2}$ of an Inch thick."

- (b.) No. 68.
4th February 1859. 2. Letter ^[b] from the Officer Commanding Madras Artillery Centre Division.

Reports, "that the Experimental Traversing Platform, as proposed by Lieut. Colonel Maitland, has by the additional slope given to it and the increased friction caused by the enlarged circular plate of the Trail pin bearing upon the traversing plank, stood well the trial it has undergone, but that as the strain upon the end of the trail plank is still very great and might damage the platform in prolonged continuous firing, I would suggest the trail plank being made about nine inches longer and that a long wedge or quoin should be screw-

ed on at the end of each wheel plank, for the purpose of checking the recoil."

3.

[c.] 8th February 1859.

MEMORANDUM. [c]

"The Traversing Platform for 24 Pounder Gun was lengthened by fixing planks in prolongation of the wheel and trail planks, preserving at the same time the regulated slope, and removing the trail pin and bolts from the rear transom of the carriage to allow of a free recoil.—Six rounds with the service charge of 8 lbs. were then fired as follows."

Rounds.	Recoil.		Distance from end of groove in trail plank to centre of Pin trail hole in transom of Carriage.		Remarks.
	feet.	ins.	feet.	ins.	
1	9	0	1	8	{ Sand bags placed on the wheel planks.— Recoil of Carriage not sufficient to reach the bags. Ditto Recoil checked by the bags. Sand bags removed before this round. { Sand strewed over surface of trail plank which was wet with heavy dew. Ditto Ditto Ditto Ditto
2	9	6	2	2	
3	10	8	3	4	
4	10	2	2	10	
5	9	9	2	5	
6	10	2	2	10	

ARTILLERY DEPOT,
SAINT THOMAS' MOUNT
8th February 1859.

(Signed) G. BRIGGS Lieut. Colonel.
Acting Director Artillery Depot.

4.—*Memorandum of a trial of the proposed Platform after alteration.*—

[d.] 23rd February 1859.

MEMORANDUM [d.]

"The undermentioned alterations having been made to the Traversing Platform, it was submitted to a further test with a 24 Pounder Gun, and service charge of 8 lbs. the result as below noted :"—

" Wheel and trail planks lengthened 2 feet, with a thickness of 6 inches."

" Angle iron removed from groove of trail plank."

" Centre sleeper brought in rear of the cross-bars instead of being between them, and placed on the surface of the ground, instead of being buried one inch."

Rounds.	Elevation.	Recoil.		Remarks.
	Deg.	Feet.	Inches.	
1	4	5	8	The greatest recoil 6 feet 1 inch, left 4 feet 2 inches of groove in the trail plank to spare.— Recoil very smooth and easy.
2	"	5	8	
3	"	5	8	
4	"	6	1	
5	"	5	8	
6	"	5	6	
7	"	5	6	
8	"	5	11	
9	"	5	11	
10	"	5	8	
11	"	5	8	
12	"	5	11	
13	"	5	8	
14	"	5	8	
15	"	5	8	
16	"	5	8	
17	"	5	11	

ARTILLERY DEPOT,
SAINT THOMAS' MOUNT
23rd February 1859.

(Signed) G. BRIGGS, Lieut. Colonel.
Acting Director Artillery Depot.

OPINION.—The proof this experimental Traversing Platform has already undergone, although not conclusive, has been so far satisfactory, as in the opinion of the Committee, to call for a continued and severer trial, with the view to ascertain whether the result will justify the Committee in recommending the adoption of the proposed platform for general service in India; so as to obviate hereafter when taking 24 Pounder Heavy Field Guns into the field, either the necessity of using the cumbersome Bengal pattern platform, or the introduction of the inconvenient system of two carriages for each piece of Ordnance of this description, which has recently been established in the Bombay Presidency.

Observations of the Inspector General of Ordnance on Article 805.—The Inspector General concurs in the opinion of the Committee, of the desirableness of subjecting Lieutenant Colonel Maitland's Gun Platform to further trial.

ARTICLE 806.

ON A PLATFORM FOR 10 AND 8 INCH MORTARS PROPOSED BY LABORATORY SERJEANT C. B. WHITE ATTACHED TO THE ARTILLERY DEPOT.

A Memorandum descriptive of the construction of the proposed Platform and the method of laying it, as also a Model of the same is laid before the Committee for their opinion, by order of the Brigadier Commandant of Artillery.

Proposed Platform for 10 and 8 Inch Mortars.

The following advantages are expected to result by substituting a Platform of the proposed simplified construction for the one in present use.

A diminution of the component parts, the exclusion of iron work, and the shorter time in which it can be laid.

The component parts consist of:—2 flank sleepers, 9 feet 3 inches long, by 9 inches wide and 12 inches deep, having a groove $3\frac{1}{2}$ inch wide and 4 inches deep cut in their inner sides, and extending from one end to within 3 inches of the other; the groove being 3 inches below the upper surface of the sleeper and $5\frac{7}{8}$ inches above the under surface.

1 Centre sleeper, 9 feet 3 inches in length and 9 inches square, a projection being left at one end of 3 inches, and of equal width with the sleeper.

9 Planks, 3 inches thick, 1 foot wide and 6 feet 8 inches long.

10 Platform Pickets.

Method of laying.

The two flank sleepers are sunk $5\frac{1}{2}$ inches, the solid ends to the rear, the grooves facing inwards, and flush with the

surface of the ground, at such distance apart as to admit of the planks fitting endways in the grooves.—The centre sleeper is sunk level with the surface of the ground and equidistant between the flank ones, the projection at the end being placed upwards and to the rear; the planks are inserted in the grooves and slid along in succession, they are then secured by 10 pickets, 1 being driven in front of the planks and centre sleeper, 1 in rear of each sleeper, 1 in front and 2 outside of each flank sleeper.

The planks are prevented from moving backwards during the recoil of the Mortar by the ungrooved portion of the flank sleepers and the projection on the centre sleeper.

(Signed) C. B. WHITE, Laboratory Serjeant.

(A true Copy.)

(Signed) B. W BLACK, Major

Secretary Permanent Artillery Select Committee.

OPINION.—As the pattern of Mortar Platform suggested by Serjeant White is an ingenious modification of the Platforms in use, possessing simplicity of construction and use, the Committee consider it deserving of trial; for which purpose it is suggested that one be made up and proved at Artillery Head Quarters.

MINUTE OF DISSENT BY LIEUT. COL. G. W. Y. SIMPSON.

Serjeant White is entitled to very great credit for his proposed Platform, but I do not think it presents such advantages as to lead us to look for its adoption in the service, and so justify the outlay for its making up.

(Signed) G. W. Y. SIMPSON, Lieut.-Col.

Madras, 25th March 1859.

Observations of the Inspector General of Ordnance on Article 806.—The Inspector General recommends a trial of the modified Mortar Platform proposed by Laboratory Serjeant White.

ARTICLE 807.

ON A REPORT OF BREAKAGES IN THE LIGHT FIELD CARRIAGES AND WAGGONS OF THE C. COMPANY 2ND BATTALION ARTILLERY.

The following documents are laid before the Committee.

[a] No. 77
8th February 1859.

1. *Letter [a] from the Officer Commanding C. Company 2nd Battalion Artillery Bangalore to the Director Artillery Depot, with a Statement of breakages which have occurred in the Light Field Carriages and Waggon of the Battery under his command.*

Memorandum of the Brigadier Commandant of Artillery, dated 15th February 1859.—Observing that in his opinion the sides of the Ammunition boxes are too thin, and that they should be of the same thickness as the front, viz. 1 inch,

OPINION.—The Committee concurs with the Brigadier Commandant of Artillery in recommending that the planks of the Ammunition Boxes be throughout of the same thickness as the planks of the front of the Boxes, namely one inch, and the Committee further recommends, that in future construction of Boxes the head of the bolt which passes through the side of the box and its limber handle iron, be not countersunk as at present, and that these bolts pass through immediately below the shoulder of the Limber handle iron, instead of as at present through the sides, some inches lower—and lastly, that the wooden partition which confines the copper box be retained in its place by small ribs, (b) as the other partitions are, instead of by a deep groove in the side as hitherto.

(b.) Vide Remarks by
Colonel Croggan.

REMARKS BY COLONEL CROGGAN.

I concur generally in this report, but consider that the small ribs to retain the wooden partition of the Ammunition box would not be found strong enough to resist the lateral

pressure of the shot and shells, and the confined space would not admit of thick pieces of wood being introduced.

(Signed) J. W. CROGGAN, Colonel.

Observations of the Inspector General of Ordnance on Article 807.

The Inspector General concurs in the several recommendations recorded by the Committee in reference to the future construction of Ammunition boxes of Light Field Carriages.

MEETING 204.

EXTRACT FROM THE PROCEEDINGS OF THE MADRAS PERMANENT SELECT COMMITTEE OF ARTILLERY OFFICERS ASSEMBLED BY ORDER OF COLONEL P. HAMON BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot, Saint Thomas' Mount, 29th April 1859.

PRESENT.

COLONEL J. W. CROGGAN, *Commanding 5th Battalion Artillery.*
 LIEUT. COL. G. W. Y. SIMPSON, *Acting Principal Commissary of Ordnance.*
 LIEUT. COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*
 LIEUT. COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 LIEUT. COL. G. ROWLANDSON, *Superintendent Gun Powder Manufactory.*
 MAJOR. B. W. BLACK, *Director Artillery Depot.*
 CAPTAIN E. H. COUCHMAN, *Assistant Adjutant General of Artillery.*
 LIEUTENANT J. W. WATKINS, *5th Battalion Artillery.*

ARTICLE 808.

ON AN AMENDMENT OF THE RULES ESTABLISHED FOR THE GUIDANCE OF THE MADRAS PERMANENT SELECT COMMITTEE OF ARTILLERY OFFICERS IN THEIR PROCEEDINGS.

ARTICLE 809.

ON FIXED GAUGES FOR SHOT AND SHELL.

The Inspector General of Ordnance and Magazines di-

(a.) No. 12, 119
6th April 1859.

rects ^[a] that this subject may be laid before the Select Committee with the view

to their selecting gauges for each calibre of shot and shell,

and sending them to the Superintendent of the Gun Carriage Manufactory, as musters for the manufacture of future supplies of Ring Gauges.

[a.] Artillery Records
page 734.

OPINION.—With reference to Proceedings Article 801, Meeting 202, [a] 15th December 1858, the Committee finds that the Tables and Memorandum prepared in the Office of the Artillery Depot by Lieutenant Colonel Simpson when Director of the Artillery Depot, are in the press, but to meet the present urgent want of Ring Gauges for use at the Gun Carriage Manufactory, a Table with a Memorandum in explanation thereof, containing the information now required, has been extracted and is hereto appended.

2. The Papers in full on this subject, when printed* will be forwarded to the Inspector General for distribution in the Bengal and Bombay Artilleries.

Tables of Diameters of Shot, Shell, and Gauges, the diameters of all classes of Guns, Howitzers, and Mortars, selected from the records in the Office of the Artillery Depot, as recommended by the Artillery Select Committee in Meeting 202 Article 801 dated the 15th December 1858 for submission to the Artilleries of Bengal and Bombay with a view to the publication of a Table of Dimensions of all Ordnance &c. for the three Presidencies.

The attention of the Committee has been directed to the very incorrect tables now in use relating to diameters of shot and shell, and to the Classification and application of Gauges, and to the embarrassing misapprehensions that constantly arise from the errors referred to having been copied and repeated

[a.] With remarks vide
Appendix E.

in the Regimental Tables of the Bengal [a] as well as of the Madras Artillery.

The existence of these grave errors was first brought to the notice of the Madras Military Board by Lieut-Col. G. W.

* Have since been printed and are appended in extenso.

Y. Simpson, Director of the Madras Artillery Depôt of Instruction in November 1855, and that officer then framed and submitted amended Tables embracing the whole question of Shot, Shells and Gauges, these Tables which are comprehensive and clear, and based on the Tables published by authority in the Royal Artillery, the Committee adopts, and now proposes again to urge on the attention of authority that they may in communication with the Artillery of Bengal and Bombay be substituted for the incorrect Tables alluded to.

The Committee in explanation will notice here some of the errors found in existing Tables.

1st. In the Tabular statements published by authority, and republished in Bengal we find that under the heading of "diameters of Shot and Shell" the diameters of Gauges for the usual projectiles have been erroneously entered, the diameter of the latter being entirely different from the diameter of the Shot and Shell to which they relate, the High Gauge being a diameter greater than that of the corresponding Shot or Shell, and the low Gauge a diameter smaller than that of the corresponding Shot and Shell.

The mischief resulting from this error is found in the use which has been made of the Table in determining windage, the diameters of Gauges, erroneously entered as Diameters of Shot and Shell, having been deducted from the diameters of Bores,

[b.] Table A, Appendix. instead of the true diameters of Shot and Shell which are not given in the [b] Table.

To remedy this, Table A in the appendix was prepared, this Table exhibits the true diameters of Bores, of Shot and Shell, and of Gauges, and is compiled from Colonel Burns' Table, the Aide Memoire, Griffiths' Manual and Lefroy's Tables—the Table now again submitted brings together in a connected form the information on these subjects spread over several works and Tables in the Royal Artillery.

The Column of unserviceable Shot, Shell, and Ordnance, was entered under the orders of the late Military Board, in

conformity with the rule that one full windage for each piece added to the true diameter of Bore, condemned that piece, and that one full prescribed windage, deducted from true diameter of Shot or Shell, condemned Shot and Shell. The Committee now however proposes to adopt in the Madras Artillery the rules obtaining in the Royal Artillery, for determining the serviceable and unserviceable character of Ordnance and Projectiles.

In consequence of the bores of certain Pieces of Ordnance, of the same designation, being of different diameters, and consequent on the varying diameters of Shot, hollow Shot and Shell, for the same Calibre? very great perplexity had been experienced in the application of the Gauges, and inevitably so, for consequent on successive changes in the construction of Ordnance, and the introduction from time to time of Projectiles of new classes and diameters, the necessity has ensued of also introducing *different Gauges for the different Projectiles for the same Piece*. To obviate these difficulties Lieut. Col. Simp-

son submitted a table marked B ex-

hibiting the prescribed diameters of

Bores of every piece of Ordnance in the British Service, the prescribed diameters of Shot and Shell &c, for all classes and description of Ordnance, and the diameters of all Gauges for every Class and description of Projectiles, and attached to this

Table B, with Memo: Appendix-

Table a Memorandum C in appendix, a Key to the Gauges, shewing the definition and application of the several Gauges in the Service to the

corresponding Projectiles for Guns, Howitzers, and Mortars.

Lient. Col. Simpson at the same time, November 1855, also called the attention of Authority to the important fact that the new classes of Gauges are only applicable to the new projectiles, and that if this caution be not borne in mind the use of the new Gauges will condemn all the old Shot and Shell in the Service, as the new Gauge 'Low' has a larger diameter than the old Gauge 'High'; for instance, applying

this statement to one of the most important of our Projectiles, Shells 24 Pounder, we find

	New Gauge.	Old Gauge.
	' Low'	' High'

5½ Inch or 24 Pdr, Shells.....	5·57.....	5·52
--------------------------------	-----------	------

4½ Inch or 12 Pdr. Shells.....	4·43.....	4·42
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so that, as before observed, the New ' Low' Gauge is larger than the old ' High' Gauge, and the application of the New Gauge to the old Projectiles would therefore condemn all the old Class 24 Pounder and 12 Pounder Shells in this Country.

The first important step, under these considerations, to adopt, was the separation and classification of the new and old Projectiles, stored in the several Arsenal, the new projectiles, that is those received since 1842, being gauged with the new Gauges, and the old Stores, that is those received prior to that date, with old Gauges, and this separation and classification of Projectiles has since been carried out in every Arsenal in this Presidency.

Subjoined is a memorandum exhibiting the diameter of old Gauges, which Gauges have not their diameters marked on them, as the new Gauges have.

Diameters of old Gauge Appendix C.

At a subsequent date to November 1855, by the express desire of the late Military Board the very comprehensive Table marked D, in appendix, was prepared in the Artillery Depôt by Major Rowlandson—this table also exhibits the Authorities on which each entry has been recorded.

Table D. Appendix.

The Committee, with this brief sketch, now beg to recommend that the several tables be attached to these proceedings and forwarded to the Depots of Instruction of the Bengal and Bombay Artilleries, inviting communication with this Committee, with a view to the establishment of identical rules, on these subjects, in the three Presidencies.

APPENDIX A.

Table of Diameters of Bores, Shot and Shells and Gauges.

Nature of Ordnance.	Diameter of		Wind- age.		Gauges.		Unservice- able.		Unservice- able.	
	Bore.		Shot and Shells.				Shot and Shells de- ducting Established Windage.		Shot and Shells	
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
Guns Iron.	13 Inch	12	11-83	15	11-88	11-8	Amended Table.		Military Board's Table 18th April 1845.	
	10 "	10	9-85	15	9-87	9-82				
	8 "	8-05	7-925	15	7-95	7-82	7-77	8-20		
	68 "	8-12	7-925	15	7-95	7-9	7-775	8-27	7-80	8-27
	56 "	7-65	7-48	15	7-51	7-45	7-22	7-80	6-69	7-8
	42 "	6-937	6-765	15	6-795	6-729	6-615	7-085	6-69	7-16
	32 "	6-41	6-177	15	6-207	6-147	6-027	6-56	6-10	6-56
	24 "	5-823	5-611	15	5-639	5-584	5-46	5-773	5-54	5-97
	19 "	5-292	5-099	15	5-124	5-074	4-94	5-442	5-04	5-44
	12 "	4-623	4-454	15	4-476	4-432	4-304	4-773	4-40	4-77
Carronades.	68 Pdr.	8-05	7-925	15	7-95	7-80	7-775	8-20	7-80	8-2
	42 "	6-84	6-765	15	6-795	6-729	6-615	6-99	6-68	6-99
	32 "	6-23	6-177	15	6-207	6-147	6-027	6-4	6-10	6-4
	24 "	5-68	5-611	15	5-639	5-584	5-461	5-88	5-54	5-83
	18 "	5-16	5-099	15	5-124	5-074	4-949	5-31	5-04	5-31
	12 "	4-52	4-454	15	4-476	4-432	4-304	4-67	4-40	4-67
	9 "	4-14	4-10	1	4-06	4-06	4-4	4-24	4-00	4-29
	6 "	3-60	3-547	1	3-532	3-532	3-467	3-7	3-49	3-75
	9 Pdr.	4-2	4-1	1	4-1	4-06	4-4	4-2	4-00	4-30
	6 "	3-68	3-567	1	3-568	3-528	3-467	3-769	3-49	3-76
Iron and Brass Mortars and Howitzers.	3 "	2-91	2-823	1	2-833	2-803	2-723	3-01	2-77	3-01
	13 Inch	13	12-84	15	12-88	12-80	12-69	13-15	12-75	13-15
	10 "	10	9-84	15	9-88	9-80	9-69	10-15	9-75	10-15
	8 "	8	7-86	15	7-9	7-82	7-71	8-15	7-80	8-15
	5½ "	5-62	5-57	1	5-62	5-57	5-49	5-72	5-54	5-76
	4½ "	4-52	4-45	1	4-476	4-432	4-3	4-62	4-40	4-62
	24 Pdr.	5-68	5-595	1	5-62	5-57	5-49	5-76	5-54	5-76
	12 "	4-52	4-454	1	4-476	4-432	4-254	4-62	4-40	4-62
	8 "	3-68	3-567	1	3-568	3-528	3-467	3-769	3-49	3-76
	6 "	2-91	2-823	1	2-833	2-803	2-723	3-01	2-77	3-01

(c) Boxer's new Tables and the Aide-Memoire Artillery Table D. } The Low Gauge being 5-57, the Shell marked a or 5-95, is that
 A. Griffiths' 6th Edition, Page 91. Table "Shells." } in the service, it really measured between 5-57 and 5-59.

For each Calibre there are two Gauges, the high and low, shot ought to pass through the large and not through the small. Shot and Shells are admitted into the service by the high and founders low Gauge, but after admission they are not to be condemned until they pass through the unserviceable or low Gauge. The Established Windage of Iron Guns and Mortars is .15 and of Brass Guns, Howitzers and Mortars .1 of an inch, these dimensions added to the diameter of the bore in the first Column, give the diameter of the enlarged or unserviceable bore.

The vents of all Ordnance are 2-9ths of an inch in diameter—if any exceed three-tenths the vent bolt is to be condemned.

ARTILLERY DEPOT, } N. B.—The Gauges for (Signed) G. W. Y. SIMPSON Major,
 SAINT THOMAS' MOUNT, } Howitzers and Mortars, Iron
 26th November 1855 } and Brass, are identical.

(a) English, (b) English.
 c The undermentioned diameter of both Guns and Projectiles in the Royal Artillery differs from the above—

APPENDIX B.

Table exhibiting the Calibre of Ordnance, prescribed Diameters of Projectiles, and Gauges, for Solid Shot, Common Shells, Hollow and Naval Shells, and Spherical Case Shot, compiled from Griffiths' Artillerists Manual, Burns' Tables, the Royal Artillery Tables and Aide Memoire, Table D Artillery.

Nature of Ordnance.		Diameter of Bore.	Diameter of Shot or Shell.	Gauges for Shot or Common Shell.		Gauges for Hollow Shot.		Gauges for Common Shells and Sphl. Case.		Gauges for Shot only.	
				High.	Low.	High.	Low.	High.	Low.	High.	Low.
Guns.	12 inch.	12	11.85	..	..	11.88	11.80	..	..	..	..
"	10 "	10	9.85	..	..	9.875	9.825	9.87	9.82	..	..
"	8 "	8	7.925	..	..	7.95	7.90	7.95	7.90	..	..
Howitzers	10 "	10	9.84	..	..	..	..	9.88	9.80	..	..
"	8 "	8	7.86	..	..	..	..	7.90	7.82	..	..
Guns.	68 Pdr.	8.12	7.925	7.95	7.90	7.95	7.90	7.90	7.82	..	..
"	56 "	7.65	7.48	7.51	7.45	7.51	7.45	7.51	7.45	..	..
"	42 "	7.6.93	6.765	..	..	..	..	6.79	6.745	6.795	6.735
"	32 "	6.41	6.17	6.207	6.147	..	..	6.207	6.147	..	..
"	24 "	5.823	5.61	..	..	..	..	5.62	5.57	5.639	5.584
"	18 "	5.29	5.099	5.124	5.074	..	..	5.12	5.07	..	..
"	12 "	4.623	4.527	..	..	..	..	4.476	4.432	4.54	4.505
"	9 "	4.20	4.099	..	..	..	..	4.10	4.06	4.117	4.082
Mortars.	13 inch.	13	12.84	12.88	12.80	Common Shells only.					
"	10 "	10	9.84	9.88	9.80						
"	8 "	8	7.86	7.90	7.82						
Brass Howitzers	24 Pdr.	5.72	5.595	..	..	..	..	5.62	5.57	..	..
"	12 "	4.58	4.454	..	..	..	..	4.476	4.43	..	..
Brass Mortars.	5½ inch.	5.62	5.595	5.57	5.57	Common Shells only.					
"	4½ "	4.52	4.45	4.47	4.43						
Brass Guns.	9 Pdr.	4.2	4.099	..	..	..	..	4.10	4.06	4.117	4.082
"	6 "	3.668	3.567	..	..	..	..	3.568	3.532	3.585	3.55
"	3 "	2.91	2.82	..	..	..	..	2.833	2.803	2.838	2.808

• Hollow Shot and Naval Shells.

¶ 6.37, 6.35, 6.308.

† Common Shells.

|| 24 Pdr. English.

‡ 9 feet 6 inch.—10 feet 6.97.

§ 12 " "

ARTILLERY DEPOT,
SAINT THOMAS' MOUNT
25th January 1856.

(Signed) G. W. Y. SIMPSON, Major,
Director Artillery Depot.

MEMORANDUM ATTACHED TO B.

Definition and Application of all Gauges in the Service for Guns, Howitzers, and Mortars.

- Gun 10 Inch.* Has two sets of Gauges one set, 9·875 high and 9·825 low for Hollow Shot, and Gauges 9·87 high and 9·82 low for common Shells and Spherical Case.
- Gun 8 Inch.* Has only one set of Gauges for all Projectiles 7·95 high and 7·90 low for Hollow Shot, common Shells and Spherical Case.
- Howitzer 10 Inch.* Has only one set of Gauges 9·88 high and 9·80 low for common Shells and Spherical Case.
- Howitzer 8 Inch.* Has only one set of Gauges 7·90 high and 7·82 low for common Shells and Spherical Case.
- Gun 68 Pounder.* Has two sets of Gauges one of 7·95 high and 7·90 low for Shot and Shells common and one set of 7·90 high and 7·82 low for Spherical Case.
- Gun 56 Pounder.* Has only one set of Gauges 7·51 high and 7·45 low for Shells common, Hollow Shot or common Shells and Spherical Case.
- Gun 42 Pounder Iron.* Has two sets of Gauges one of 6·79 high and 6·745 low for common Shells and Spherical Case, and the other set 6·795 high and 6·735 low for solid Shot only.
- Gun 32 Pounder Iron.* Has one set of Gauges 6·270 High and 6·147 low for Shells common, Spherical Case and Solid Shot.

Gun 24 Pounder Iron. Has two sets of Gauges, one of 5·62 high and 5·57 low for Shells common and Spherical Case, and one set of 5·639 high and 5·584 Low for solid Shot only.

Gun 18 Pounder Iron. Has apparently only one set of Gauges but entered differently, one set 5.124 high and 5·074 low, and one set of 5·72 high and 5·07 low. We have no means of *accurately* measuring the third place of decimals.

Gun 12 Pounder Iron. Has two sets of Gauges one 4·476 high and 4·432 low for Shells common and Spherical Case and one set 4·54 high and 4·505 low for solid Shot only.

Gun 9 Pounder Iron. Has two sets of Gauges one 4·10 high and 4·06 low for Spherical Case and one set of 4·117 high and 4·082 low for solid Shot only.

Mortar Iron 13 Inch. Has only one set of Gauges 12·88 high and 12·80 low for Shells common.

Mortar Iron 10 Inch. Has only one set of Gauges 9·88 high and 9·80 low for Shells common.

Mortar Iron 8 Inch. Has only one set of Gauges 7·90 high and 7·82 low for shells common.

Brass Howitzer 24 Pounder. Has only one set of Gauges 5·62 high and 5·57 low for shells common and Spherical case.

Brass Howitzer 12 Pounder. Has only one set of Gauges 4·476 high and 4·43 low for shells common and Spherical case.

Brass Mortar 5½ Inch. Has only one set of Gauges 5·62 high and 5·57 low for shells common.

Brass Mortar 4½ Inch. Has only one set of Gauges 4·47 high and 4·43 low for shells common.

Brass Gun 9 Poun- Has two sets of Gauges one 4.10 high and 4.06 low for Spherical case and one of 4.117 high and 4.082 low for solid Shot.

Brass Gun 6 Poun- Has two sets of Gauges one 3.568 high and 3.532 low for Spherical case, and one 3.585 high and 3.55 low for solid shot.

Brass Gun 3 Poun- Has two sets of Gauges one set 2.833 high and 2.803 low for Spherical case and the other 2.838 high and 2.808 low for solid shot.

ARTILLERY DEPÔT, } (Signed) G. W. Y. SIMPSON, Major,
25th January 1856. } *Director Artillery Depot.*

APPENDIX C.

MEMORANDUM.

Nature of Ordnance.		Old Gauges for Shot and Shell "old."		Remarks.
		High.	Low.	
Guns.....	Iron.	8 Inch...	These diameters were taken by me in the Arsenal in 1851, and verified at the Artillery Depôt November 1855.
		68 Pdr...	.....
		56 "	.....
		42 "	.....
		32 "	6.207	
		24 "	5.60	
	Brass.	18 "	5.13	
		12 "	4.46	
		9 "	4.1	
		6 "	3.568	
Mortars.....	Iron	3 "	2.83	
		13 Inch...	12.88	
		10 "	9.88	
	Brass	8 "	9.8	
		5 1/2 "	7.85	
Howitzers.....	Brass	5 1/2 "	5.52	
		4 1/2 "	5.50	
		4 1/2 "	4.42	
	Iron	10 "	4.38	
		8 "	9.88	
	Brass	24 Pdr...	9.8	
		12 "	7.85	
		4 1/2 "	5.60	
		4 1/2 "	4.46	
	Brass	4 1/2 "	4.42	
		4 1/2 "	4.38	

GAUGES. The 13 inch and 10 inch old Shells as well as all the old Stores of Shot being Gauged by the old Gauges, The new Projectiles, that is Projectiles received since the year (I think 1842) being gauged with the new Gauges received about the same period.

ARTILLERY DEPOT. } (Signed) G. W. Y. SIMPSON, Major,
10th December 1855 } *Director Artillery Depot.*

Attached is a Memorandum shewing diameters of "Old Gauges" which Gauges have not their respective diameters marked on them as all the new Gauges have.

APPENDIX D.

Table of Diameters of Bores of Ordnance Gauges for Shot, Shells &c. prepared as directed in Military Board's letter No. 4290 dated 21st November 1856—The authorities from which the Table is compiled are designated by the following letters.

- a. Royal Artillery Tables, vide Appendix to Memorandum on Projectiles,
- B. Lefroy's Hand Book for Field Service.
- C. Artillerist's Manual (6th Edition.)
- D. Aide Memoire.
- E. Military Board's Circular order No. 5 April 1845.
- F. Page 11 Memorandum on Projectiles.
- G, Madras Gunners Assistant (5th Edition) and actual measurement.

Guns of which the present store is to be used up and the supply discontinued are denoted by an asterisk prefixed to them, as noted by Lefroy.

Description.	Of the Piece.					Of the Bore.		Diameter of Gauge.		Windage of Projectiles.		Remarks.	
	Length.		Weight.			Length.	Diameter.	High.	Low.	Least.	Highest.		
	feet.	ins.	cwt.	qrs.	lbs.								feet.
CARRONADES													
68 Pounder.	B 5	4	36B					F 8-050	{ 7-95 a 7-95 E	{ 7-9a 7-85E	{ -100 -100	{ -150 -200	The Artillerist's Manual gives 6-72 as the Low Gauge.
42 "	B 4	6	22B					F 6-840	{ 6-795 a 6-795 E	{ 6-745a 6-729E	{ -045 -045	{ -95 -111	
32 "	{ B 3 11-7 C 4	{ 17B 17C				B3	6-6	F 6-250	6-207 a	6-147a	-043	-103	
24 "	{ B 3 7-4 C 3 9	{ 13B 13C				B3	2-7	F 5-680	5-639 a	5-584a	-041	-096	
18 "	B 2 9	4 10E				B3	0-3	F 5-160	5-124 a	5-074a	-036	-086	
12 "	B 2 8	61				B2	4-7	F 4-520	4-476 a	4-432a	-044	-088	
9 "								F 4-140	4-1 E	4-06E	-040	-080	
6 "								F 4-110	4-1 E	4-06E	-010	-050	
								F 3-600	3-568 E	3-532E	-032	-068	
Guns Iron 10 inch.	a 10 (a) 6	112 a				a 10	1-2	F 10-000	98-75 a	9-825a	-125	-175	(a) In the Artillerist's Manual and Lefroy there is one Gun of 10 feet.
	a 9 4	85 a				a 9	1-35						
Guns Iron 8 Inch.	{ a 9 a 8 10 a* 6 8-5 a 10 10	{ 65 a 60 a 50 a 112 a				{ a 8 a 8 a 6 a 10	{ 9-27 7-35 5-7 3-4	F 8-050	{ (b) 7-95 a (c) 7-95 a	{ (b) 7-9a (c) 7-82a	-100 -100	-150 -230	(b) Hollow Shot & Naval Shell. (c) Common Shell.
	{ a 10 a 9 6 D 6 8-5 a* 11 a* 10	{ 95 a 87 a 50 D 98 a 87 a				{ a 9 a 8 D 6 a 10 a 10	{ 3-075 11-7 8-5 4-86 1-82						
68 Pdr.....								F 8-120	7-95 a	7-9a	-170	-220	
									7-95 E	7-85E	-170	-270	
								F 8-050	7-95 a	7-9a	-100	-150	
56 Pdr.....								F 7-650	7-51a	7-45a	-140	-200	
42 Pounder.								F 7-010					{ No Gun corresponding with the diameter of Bore given in any of the authorities.
42 "	{ *10a *10a D 9 6-5	{ 84 a 75 a 85 D				{ a 9 a 9 D 9	{ 6-07 6-07 6	F 6-970	{ 6-795a 6-795 E	{ 6-723a 6-729E	-175 -175	-235 -241	
42 "	*9	6a	67 a			a 9	0-73						F 6-935	{ 6-795a 6-795 E	{ 6-733a 6-729E	-140 -140	-200 -206
42 "	c 9	6	67 c					F 6-930	{ 6-795a 6-795 E	{ 6-735a 6-729E	-135 -135	-195 -201						{ As the Artillerist's Manual only gives two places of decimals it is presumed this is the same Gun as the preceding viz. 6 935 Calibre.
52 "	{ a* 9 a* 9 a 8	{ 7 64 a 56 a 50 48 a				{ a 9 a 8 a 7	{ 3-2 11-2 5-22						F 6-410	6-207a	6-147a	-203	-263
32 "	{ a 9 a* 9	{ 50 a (d) 46 a				{ a 8 a 8	{ 7-08 5-4	F 6-375	6-207a	6-147a	-168	-228	
32 "	{ a 8 a 8 a 7	{ 45 a 42 a (e) 41 a				{ a 8 a 7 a 6	{ 1-23 7-25 11-42						F 6-350	6-207a	6-147a	-143	-203	{ (d) Bored up from 24-Pounder of 48 cwt. (e) Bored up from 18-Pounder of 42 cwt. (f) Bored up from 24-Pounder of 41 cwt.
32 "	{ a 7 D 9 a* 6	{ 6 (f) 40 a 50 D 6 (g) 32 a				{ a 6 D 9 a 5	{ 11-42 5-08 11-79	F 6-300	6-207a	6-147a	-093	-153	
22 "	{ a 6 a 5 4 a 5 4 a 9 6 a* 6 B 6	{ (h) 25 a 25 a 25 a 50 a 48 a 32 a 20 B				{ a 5 a 5 a 8 a 8 a 5 a 5 B 5	{ 7-64 4-00 9-90 11-41 5-45 11-79 5-1						F 5-823	5-639a	5-584a	-184	-239	{ (g) Bored up from 24-Pounder of 33 cwt. (h) Bored up from 18-Pounder of 27 cwt.

Description.	Of the Piece.					Of the Bore.			Diameter of Gauge.		Windage of Projectiles.		Remarks.
	Length.		Weight.			Length.		Diameter.	High.	Low.	Least.	Highest.	
	feet.	ins.	cwt.	qrs.	lbs.	feet.	ins.						
18 Pdr.....	a 9	.....	42 a	a 8	5 75	F 5 292			5 124a	5 074a	168	218	[i] Bored up from 12 Pounder of 21 cwt. [j] Bored up from 9 Pounder of 17 cwt.
18 "	a 8	.....	38 a	a 7	5 74								
	a 7	.....	22 a	a 6	6 48								
	a 6	[i] 20	a	a 5	6 05	F 5 170			5 124a	5 074a	046	096	
12 "	a 5	[j] 15	a	a 5	0 75								
	a* 9	.....	34 a	a 8	6 23				[k] 4 540	a[k] 4 505a	083	118	[k] These Gauges have been received at Madras
	a* 8	6	33 a	a 8	0 221	F 4 623			4 476E	4 432E	147	191	
	a* 7	6	29 a	a 7	0 24								
	a 6	.....	21 a	a 5	6 515								
GUNS BRASS													
9 "	G 5	8 5	10 G	G 5	5 75	F 4 200			4 100aE	4 060aE	100	140	In the Royal Artillery Tables, the Gauges 4-1 and 4-06 are for Shells and Spherical Case, and the Gauges 4-117 and 4-082 for Shot only. These latter Gauges have been received at Madras.
	G 5	6	9 G	G 5	2 5				4 117a	4 082a	082	118	
	D 6	.....	12 2	D 5	7 74								
6 "	D 5	.....	6 D	D 4	9 47	F 3 668			3 568aE	3 532aE	100	136	In the Royal Artillery Tables the Gauges 3 568 and 3 532 are for Shells and Spherical Case Shot and the Gauges 3 585 and 3 550 for Shot only. These latter have been received at Madras.
	D 7	.....	12 D	D 6	8 35				3 585a	3 550a	082	118	
3 "	D 3	.....	2 1	D 2	10	F 2 910			[l] 2 833aE	[l] 2 803aE	077	107	[l] For Shells and Spherical Case Shot in the Royal Artillery Tables. [m] For Shot only in Royal Artillery Tables.
	D 4	.....	3 D	D 3	10				[m] 2 838a	[m] 2 808a	072	102	
	D 6	0 2	6 D	D 5	9 2								
HOWITZERS BRASS.													
32 Pounder.	D 5	.....	17 2	D 5	1 16	F 6 250			6 207a	6 147a	043	103	D Length of Chamber 10.26 inches. Aide Memoire, Lefroy and Artillerist's Manual give the diameter of Bore 6 20, Royal Artillery Tables 6 250. D Length of Chamber 8 76 [n] Artillerist's Manual 13 cwt. G Length of Chamber 8 47. [o] These are Gauges for Shot only in the Royal Artillery Tables. G Length of Chamber 6 8 [P] The Aide Memoire and the Artillerist's Manual give 4 58
24 "	D 4	8 5 [n]	12 D	D 4	7 58	F 5 720			5 620a	5 570a	100	150	
24 "	G 4	.....	G 10	G 8	10 5	F 5 660			5 620a	5 570a	040	090	
									[o] 5 629E	5 584E	021	076	
12 "	G 3	9 6	G	G 3	8								
4 1/2 Inches [Light.]	D 1	10 3	D 2	D 1	4 1	F 4 520			P 4 476a	4 432a	044	088	
4 1/2 Inches [Coborn.]	D 1	10 3	D 2	D 1	4 1								
12 Pdr. M. T.	G 2	9 3	G	G 2	8 15	F 4 500			4 476a	4 432a	024	068	
MORTARS IRON.													
13 Inch	G 3	3 5 26	G	G 2	2								G Length of Chamber 13 Inch D " " " 15 1 " D " " " 11 6 " G " " " 16 " D " " " 11 7 " D " " " 9 58 "
	D 4	4 100	D	D 2	3	F 18 000			12 88a	12 80a	120	300	
	D 2	5 5 26	D	D 2	8 5								
	G 2	4 16	G	G 1	8								
	D 3	9 50	D	D 2	11	F 10 000			9 88a	9 80a	120	200	
10 "	D 2	7 5 18	D	D 2	1								

Description	Of the Piece.				Of the Bore.		Diameter of Gauge.			Windage of Pro- jectiles.		Remarks.		
	Length.		Weight.		Length.		Diameter.	High.	Low.	Least.	Highest.			
	feet.	ins.	cwt.	qrs.	ft.	ins.								
							ins.	ins.	ins.	ins.	ins.			
MORTARS IRON. (Continued)														
8 Inch	G	1 10-5	8	G	1	4	F 8-000	{	7-90a	7-82a	100	{	G Length of Chambers	
	D	2 1-25	9	D	1	8			7-95E	7-85E	150		ins.	
	C	1 10	8	C									D " " " 7-5 "	
HOWIT- ZERS IRON.														
10 Inch	a	8	40	a	a 6	10-75	F 10-000	{	9-88a	9-80a	120	{		
8 "	a	6	20	a	a 3	10-8	F 8-000		7-90a	7-82a	100		180	D " " " 11-25 "
									7-95E	7-85E	150		180	D " " " 9-6 "
MORTARS BRASS.														
4½ Inch	G	1 5	G 1 2	G 1	1	[g] F 5-660	{	a 5-62	5-57a	100	{	Length of Chamber 5-2 inches. [g] This is the 24-Pdr. Howitzer Bore. The Madras Mortars and in Aide Memoire and the Artillerist's Manual are 5-62. [r] These are Gauges for Shot only in the Royal Artillery.		
	E [r]	5-635						[r] 5-585E	5-52E	121			090 076	
4½ "	G	1 1	G 3	G 10-8	F 4-320	{	4-476a	4-432a	104	088	{	Length of Chamber 3-8 ins.		
	D	1 0½	D	D 10-13									" " " 3-9 "	

N.B.—In addition to the above Gauges for $5\frac{1}{2}$ and $4\frac{3}{4}$ Inch Shells, there are still in use in Madras, Gauges of the following Diameters for the old supplies of Projectiles Viz $5\frac{1}{2}$ Inch, H. 5-56, L. 5-52. $4\frac{3}{4}$ Inch H. 4-42. L. 4-38.

In the "length of Bore" is included the length of Chamber, of all chambered Ordnance.

REMARKS.

There are two descriptions of 10 Inch Guns: four of 8 inch Guns, and three of 68 Pounders: one Calibre for each Class: but the Projectiles used with the 8 inch Guns are not identical in the Land and Sea Service:—The 8 inch Hollow Shot for Land Service weighs about 47 lbs., being in fact the shell plugged, but for Sea Service 56lbs. (Lefroy.)

There are four Calibres of 32 Pounders, Viz. three of 6-41 one of 6-375, six of 6-35, and four of 6-30. The Projectile being the same for all, the difference falls on the Windage. The same remark is equally applicable to all other Ordnance of varying Calibre of the same denomination. (Lefroy.)

In preparing the foregoing Table, a preference was given to the Royal Artillery Table; other authorities being quoted, only where a difference existed between them, or when they afforded information not given in the Royal Table.

ARTILLERY HEAD QUARTERS,
ARTILLERY DEPOT,
SAINT THOMAS' MOUNT,
4th December 1856.

(Signed) G. ROWLANDSON, Major,
Director Artillery Depot.
(Signed) ÆNEAS SHIRREFF,
Brigadier Commandant of Artillery.

APPENDIX E.

Tables Shewing the Established Diameters of Bores of Guns, Howitzers and Mortars and Carronades, and of Founders High and Low (and Unserviceable) Gauges, as received from the Honorable Court of Directors, with Military Board's letter No. 5514 and Government letter No. 670, dated the 9th of April 1855, and 23rd March 1855, forwarded with letter dated 8th December 1855, Ordnance Office Calcutta.

Established.	Gauges. Shells common and Spherical, and for Shot of*												Gauges for Shot only.			
	13 Inch.	10 Inch.	8 Inch or 68 Pdr.	5½ Inch.	68 Pdr. Naval.	56 Pounder.	42 Pounder.	32 Pounder.	24 Pdr. Howitzer.	18 Pdr. Howitzer or 4½ Inch Mortar.	12 Pdr. Howitzer or 4½ Inch Mortar.	12 Pdr. Mountain Train.	9 Pounder.	6 Pounder.	3 Pounder.	3 Pounder.
Bores of																
Iron Guns Howitzers and Mortars.	13	10	8	A	8 05	7 65	7 018 6 41	5 823 5 292 4 623	4 52	4 52	4 52	4 52	4 2	3 668 2 913	3 668 2 913	3 Pounder.
Brass " "																6 Pounder.
Iron Carronades.																3 Pounder.
Gauges High.	12 88	9 88	7 9	G	7 95	7 51	6 795 6 207 5 62	5 124 4 476 4 476 4 1	4 476 4 1	4 476 4 1	4 476 4 1	4 476 4 1	4 476 4 1	4 476 4 1	4 476 4 1	3 Pounder.
" Low.	12 8	9 8	7 82	G	7 45	6 745 6 147 5 57	5 074 4 432 4 432 4 06	4 432 4 06	4 432 4 06	4 432 4 06	4 432 4 06	4 432 4 06	4 432 4 06	4 432 4 06	4 432 4 06	3 Pounder.
" Unserviceable.	12 75	9 75	7 8		5 547	7 85	7 4	6 684 6 105 5 547 5 04	4 403 4 403 4	4 403 4 403 4	4 403 4 403 4	4 403 4 403 4	4 403 4 403 4	4 403 4 403 4	4 403 4 403 4	3 Pounder.

5 62 to be entered at (a) if Government sanction the Mortar being recast

C of D Table gives
6 745 Shells.
6 735 Shot.
(Int.) A.A.

True Copy.
(Signed)

J. LAWDER,
Asst Secretary.

True Copy.
(Signed)

J. CARTLAND,
Registrar.

(Signed) E. DOYLEY, Lieut.
Offg, Secretary P. S. C.
of Artillery Officers.

REMARKS ON THE ABOVE BENGAL TABLE OF DIAMETERS OF BORES.

- A—The 8 Inch Gun and the 68 Pounder are entered under this heading as having the common diameter of Bore 8" this is incorrect, the diameter of Bore of the 8 inch Gun is 8.05 and diameter of Bore of 68 Pounder 8.12.
 The 8 inch Pieces stand thus:
 8 Inch Mortars and Howitzer 8.
 8 " Gun and 68 Pounder Carronade 8.05.
 68 Pounder Land and Sea Service is 8.12
 B—The diameter of Bore of the 68 Pounder is entered 8.05, the correct diameter is 8.12.

REMARKS ON THE ABOVE ENTRIES IN

- G } The Gauges here entered 7.9 High and 7.82 Low are for
 and } the 8 inch Mortar Iron and the 8 Inch Howitzer Iron
 G } *exclusively*.
 The Gauges for the 8 inch Gun and 68 Pdr. Gun and Carronade are 7.95 High and 7.9 Low.
 H—The Low Gauge 42 Pounder Gun is 6.735 for solid Shot and 6.745 for Common Shells.
 The Low Gauge 42 Pounder Carronade is 6.72.
 L—This line should be omitted altogether, These Gauges are called Founders Gauges, and are unknown in the Regiment of Artillery, the Founders Low Gauge is only used (with the Service high Gauge) in admitting Projectiles into the Service—never afterwards—The only Artillery Gauges are the High and Low Gauges, the one condemns as unserviceable Shot and Shell when too large, and the other when too small.
 Every Projectile must pass through the High Gauge or it is unserviceable.
 No Projectile must pass through the low Gauge or it is unserviceable.

- C—There are two diameters of Bores 42 Pounder, 6.97 and 6.39, I cannot find a diameter 7.018.
 D—The word Howitzer should be omitted in the heading of this column.
 E—The word Howitzer should be omitted in the heading to this column.
 F—This entry 4.476 should be omitted.
 H—This entry should be 4.52.

COLUMNS GAUGES HIGH AND LOW.

- The Founders Gauge entered as "Gauge Unserviceable" has no connection whatever with the Artillery Gauging of Shot and Shell.
 The Gauges 9.88 High, and 9.80 Low, are for the 10 Inch Mortar and 10 Inch Howitzer.
 The Gauges 9.875 High and 9.825 Low, are for the 10 Inch Gun.
 The Gauges 7.90 High and 7.82 Low are for the 8 inch Mortar and 8 Inch Howitzer.
 The Gauges 7.95 High and 7.90 Low are for the 8 inch Gun and 68 Pounder Gun and Carronade, for Hollow Shot and Naval Shells.
 There are two sets of Gauges for the 42 Pounder, one 6.795 High and 6.745 Low for Common Shells, the other 6.765 High and 6.735 Low for solid Shot.
 The Gauges 7.95 High and 7.82 Low are for the 8 Inch and 68 Pounder Gun and Carronade for Common Shells.
 (Signed) G. W. Y. SIMPSON Major,
 Director Artillery Depot.

REMARKS BY COLONEL CROGGAN.

The following remarks have reference to the Gauges in use with the Artillery as shewn in the Table attached to the Proceedings of the Committee.*

1. Gauges given for the 68 Pdr. Gun.

For Spherical case shot. For round shot and common Shell.

High Gauge. Low Gauge. High Gauge Low Gauge.

7·90 ins. 7·82 ins. 7·95 ins. 7·90 ins.

This appears to be incorrect, as more windage is given to the spherical case shot than to the common shell, the reverse being the established rule, which gives the least windage to the Spherical case.

2. The Table shews the following differences between the diameters of bores and the diameters of the several gauges.

Nature of Ordnance.	Diameter of Bore,	Difference between diameter of bore and Gauges.				Remarks.
		Spherical Case and (common Shell.		For shot only.		
		High Gauge.	Low Gauge.	High Gauge.	Low Gauge.	
<i>Guns.</i>						
12 Inch.	12	·12	·2	If so little difference of diameter or windage is found to answer for shot, why is so much more allowed for spherical case shot, and shells which are generally understood to require less.
10 "	10	·125	·175	.....	.....
8 "	8·05	·1	·15	.....	.....
<i>Howitzers.</i>						
10 Inch.	10	·12	·2	.....	.....
8 "	8	·1	·18	.....	.....
<i>Guns.</i>						
68-Pdr.	8·12	{ ·17CS	·22C.S.	.....	.....
		{ ·22SCS	·3S. C. S.	.....	.....
56 "	7·65	·14	·2	.....	.....
42 "	6·93	·14	·19	·135	·195	
32 "	6·41	·203	·263	.....	.....
24 "	5·823	·203	·253	·184	·239	
18 "	5·29	·17	·22	.....	.....
12 "	4·623	·147	·191	·083	·118	
9 "	4·20	·1	·14	·083	·118	

Nature of Ordnance.	Diameter of Bore.	Difference between diameter of bore and Gauges.				Remarks.
		Spherical Case and Common Shell.		For shot only.		
		High Gauge.	Low Gauge.	High Gauge.	Low Gauge.	
<i>Mortars.</i>						
13 Inch.	13.	.12	.2	.....	.....	For Common Shells only.
10 "	10.	.12	.2	.....	.....
8 "	8.	.1	.18	.....	.....
<i>Brass Howitzers.</i>						
24-Pdr. Eng.	5.72	.....	.....	.....	.....
24-Pdr.	5.66	.04	.09	.....	.....
12 "	4.52	.044	.09	.....	.....
<i>Brass Mortars.</i>						
5½ Inch.	5.62	.0	.03	.....	.....	For Common Shells only. The High Gauge of the 5½ Inch allows no windage.
4½ "	4.52	.05	.09	.....	.....
<i>Brass Guns.</i>						
9-Pdr.	4.2	.1	.14	.083	.118	
6 "	3.668	.1	.136	.083	.118	
3 "	2.91	.077	.107	.072	.102	

3. The differences of diameters (or windage) of the iron Guns as shewn above, being very irregular, the established gauges cannot, I consider, be correct, as these differences should bear a constant relation to the calibres, instead of which they vary throughout in an unaccountable manner.

4. The gauges for shot of the Iron guns are much larger than the gauges for spherical case shot and shells, thus giving to the shells and spherical case, a much greater windage than the shot, instead of which I believe the object should be to give the spherical case the least possible windage.

5. I cannot see any necessity for such a variety of gauges viz. for common shells, for hollow shot, for spherical case, and for shot only, (unless to admit of spherical case and shells with straps passing into the bore) and judging from the foregoing results, it appears to me that one high, and one low gauge only for each piece might with advantage be adopted,

viz. those for round shot which generally speaking differ only 2 or 3 hundredths of an inch from the others.

6. The gauges of the Mortars, Howitzers and Brass Guns appear to have been arranged with some method, with the exception of the high gauge of the 5½ inch Mortar, which is of the same diameter as the bore, having no windage.

7. As the subject of gauges concerns the British Artillery generally, both in this country and at home, I would suggest the propriety of our circulating the Table of Gauges for the consideration of the Select Committees of the Bengal and Bombay Artillery; and that only one set of such Gauges as were urgently required should be made up for immediate use according to existing dimensions.

8. I would suggest a scale being established for regulating the Gauges, the following will perhaps serve to elucidate the subject.

Gauges.	Less than the diameter of the bore.	
	High.	Low.
For 68, 56, 42, 32, 24 Pounders.....	·16	·22
For 18 Pounder.....	·14	·20
For 12 and 10 inch guns, 10 Inch } Howitzer, 13 and 10 inch Mortars. }	·12	·18
For 8 inch gun, 8 inch Howitzer, 9 } Pounder Iron gun, 8 inch Mortar, } 9 and 6 Pounder Brass Guns..... }	·1	·15
For 3 Pounder Brass Gun.....	·07	·11
For 5½ and 4½ inch Brass Mortars.....	·05	·09
For 24 and 12 Pdr. Brass Howitzers.	·04	·08

ST. THOMAS' MOUNT, } (Signed) J. W. CROGGAN, Col.
28th May 1859.

Observations of the Inspector General of Ordnance on Article 809.—The Inspector General concurs in the decision of the Select Committee on the subject of Ring Gauges, and recommends the publication of the Tables for information and guidance of Ordnance and other Officers.

Observations of the Brigadier Commandant of Artillery on Article 809.—The Gauge question is a very difficult one, and has been the subject of discussion for the last five years;—the slightest mistake in one of the decimal figures will involve a great sacrifice of Government property, by causing large quantities of the shot and shell in store, to be transferred from the head of “Serviceable” to that of “Unserviceable.”

I would therefore strongly recommend that the dimensions of our Gauges should not be fixed without first consulting the Select Committees of Artillery Officers at the other Presidencies, and when they are established, that the Ring Gauges should be made in England, where, with the use of machinery and work-people practised in this particular art, it will be done both infinitely better and cheaper than in this country.

Orders of Government on Article 809.—Approves of the suggestions by the Commandant of Artillery, and directs that the course recommended regarding Ring Gauges be pursued, and the result of the inter-communication with the other Presidencies reported to Government.

MEETNIG 205,—ARTICLE 810.

ON THE PREPARATION OF RULES FOR THE PROCEDURE OF
THE MADRAS PERMANENT SELECT COMMITTEE OF AR-
TILLERY OFFICERS.

**COMPILATION OF ORDERS, AND INSTRUCTIONS, RELATING TO THE MADRAS
PERMANENT SELECT COMMITTEE, OF ARTILLERY OFFICERS.**

26th October 1859.

Original Constitution of
the Committee.

G. O. G.

27th January 1824.

4. The Honorable the Governor in Council is further pleased to direct, that a Permanent Select Committee of Artillery Officers, shall be established at this Presidency, assembling as occasion may require, to report upon such professional matters as may be submitted for their consideration. The Committee to consist of the Principal Commissary of Stores, the Director of the Depôt of Artillery Instruction, the Assistant Adjutant General of the Artillery, and the four senior Officers of Artillery at the Mount, any five being a Committee; the senior Officer sitting as President, and the Director of the Depôt acting as Secretary, having the duty of recording all the Committee's Proceedings in his Office.

Commandant of Artillery not liable to sit on the Select Committee.

G. O. G.

27th January 1824.

Note.—Arrangements for transmission of Proceedings to Government altered, Vide Minutes of Consultation No. 627, 16th February 1858.

5. The Commandant of Artillery will not be liable to sit upon this Committee, as he will necessarily be the channel of their report to the Military Board, where he will always have an opportunity of recording his own sentiments, whether in concurrence or dissent; in the latter case, the grounds of such dissent being always recorded at length.

The Military Board (now the Inspector General) the appointed channel of all reference to the Committee, whether originating with Superior authority or otherwise

G. O. G.

27th January 1824.

6. The Military Board through the Commandant of Artillery, will be the channel of all reference to the Select Committee, upon questions on which their report may be required, whether originating with superior authority or otherwise, and any reports required by the Military Board, in the course of their own proceedings will be procured in like manner.

Exception to foregoing rule in favour of Artillery Officers, whose suggestions if approved of by the Commandant of Artillery, will be referred by him to the Select Committee.

In order, however to encourage enquiry and useful professional discussion amongst the Officers of the Corps of Artillery, an exception to this rule will be allowed in their favor, and any of them having improvements to bring forward, will accordingly be at liberty to apply as usual, to the Commandant of Artillery, who may refer the subject at once to the Select Committee, laying the result, if necessary, before the Military Board with his own opinion; a mode which will afford every facility to the Officers of the Corps, without carrying the discussion beyond it, unless the advantage of the Service should be evident to the Select Committee and the Commandant of Artillery.

No alterations of the Ordnance Carriages or Articles of Artillery, or Magazine Equipment to take place without previous report by the Select Committee.

Reported on by the Select Committee, and in cases where the Military Board may be desirous of introducing changes, contrary to the opinion of the Committee, a reference on the question at issue, will be made for the final decision of Government.

Committee a closed court.

Extract from Proceedings of the Artillery Select Committee in Meeting 2nd, 20th March 1824.

"The Secretary begs leave to put to the vote, whether the Committee is to be considered a closed Court, or Officers of the Regiment are to be allowed to be present during the debates."—"Carried unanimously a Closed Court."

Superintendent of the Gun Carriage Manufactory added to the Committee.

G. O. G. } 7. No alterations of the Ordnance Carriages or Articles of Artillery or Magazine Equipment, will in future take place, without being previously

G. O. G. No. 8, 19th January 1841.

The Superintendent of the Gun Powder Manufactory added to the Committee.

G. O. G. No. 140, 23rd June 1846.

The Commandant of Artillery empowered to summon any Officer of Artillery at the Presidency on Staff duty, or otherwise, to attend sittings of the Committee.

*G. O. G. No. 140. } 2. the Brigadier Commandant
23rd June 1846. }* of Artillery to have the power of specially summoning any Officer of Artillery, who may be at the Presidency on Staff

duty or otherwise, to attend the sittings of the Select Committee, whenever circumstances may render the attendance of such Officer desirable.

Occasions on which a Member of the Committee is to be debarred from voting.

*G. O. G. No. 140. } 3. On occasions of subjects
23rd June. 1846. }* being investigated by the Committee,

connected with the Department or Manufacture carried on under the superintendence of any Member, such as Gunpowder, Ordnance Carriages, or Laboratory Stores, or with improvements or alterations proposed by a Member, such Member to attend the Committee for the purpose of giving information, but not to have any vote upon that particular question.

It rests with the Commandant of Artillery to require the attendance of all, or any portion, or particular Members of the Committee, to be present during Experiment.

*Military Board's } To,
letter No. 59, dated } Commandant
5th January 1847. } of Artillery
Para. 1. } SIR,*

The subject of your Memorandum of the 21st December No. 1041, having been taken into consideration by the Military Board, I have the honor, by order, to express their opinion that under the Regulations* promul-

* *G. O. } mulgated by Government, establishing
27th January 1824. }* a Permanent Select Committee of Artillery Officers, it rests with you to require the attendance of all, or any portion, or particular Members, for the pur-

pose of witnessing and reporting upon such professional matters as may be submitted for their consideration.

As many Members as can be assembled, invariably to attend, excepting on occasions of a trifling nature. } *Military Board's letter No. 59, dated 5th January 1847.* } The Board desire me to take advantage of the }
Para. 2. } present reference, }
 to request that as many Members as can be conveniently assembled, should invariably attend on all occasions beyond those of a trifling nature.

Channel through which Proceedings of the Committee are to be submitted to Government. } *Minutes of Consultation No. 627. 16th February 1858.* } The Governor in Council in accordance with the }
 recommendation of the Commander in Chief, directs that the Proceedings of the Select Committee be forwarded by the Secretary to the Inspector General, for his observations, before they are submitted to the Commandant of Artillery, by whom they are finally to be laid before the Commander in Chief, through the Adjutant General for submission to Government.

RULES FOR PROCEDURE.

Meeting 205. } **RULE 1.** Papers }
Article 810. } on subjects of importance will be circulated by the Secretary to the Committee at the earliest convenient time, irrespective of the formal circulation immediately preliminary to a Meeting, to give the fullest time for pre-consideration of the subjects.

RULE II. The date and hour of receipt, and of passing papers on, in circulation, to be recorded by each Member in a Memorandum attached for that purpose.

RULE III. In cases of equality of votes on a division in Committee, the casting vote to be with the senior Member voting.

RULE IV. Notwithstanding any intention to record dissent, the Proceedings are to be signed by all members voting, as representing the opinion of the Committee collectively.

RULE V. If in course of circulation of the rough draft of Proceedings, further consideration of a subject be proposed by any member, the Secretary will put such question formally to the vote.—the Majority to decide—at the same time, as Minutes tend to embarrass the confirming authorities, members should refrain from putting in separate papers excepting on well defined grounds.

RULE VI. i.—Whenever a subject of the nature referred to in G. O. G. No. 140, dated 23rd June 1846, be laid before the Committee, the member personally intersted will not vacate his seat during the investigation, unless requested to do so by the Committee, but will remain to give information, having no vote in Committee, or by Minute; he will

(Note.) The latter portion of this Rule commencing "*or by Minute; he will however be at liberty.*" &c. has been modified by the Minute of the Brigadier Commandant of Artillery, concurred in by the Commander in Chief, in as much that, whatever a Member when debarred from voting may wish to record, is to be received, before the Committee proceed to frame its opinion.

however be at liberty when the rough draft is in circulation, to address to the Secretary, by letter, any remarks for the consideration of the Committee which he may deem of importance as affecting the opinion arrived at, thus ensuring the fullest consideration of all arguments pro and con, before a resolution be finally adopted by the Committee.

ii. The bar against a Superintendent voting on a subject discussed by the Committee, applies only to work produced by him, or to a proposal submitted by him, and therefore it by no means operates when *general* questions are discussed relating to improvements and alterations, although they may be of special interest to the Department he belongs to.

ADDITIONAL RULES.

*Letter from Com-
mandant of Arty.
No. 272, dated 26th
July 1859, to Adju-
tant General.*

*Letter from Ad-
jutant General to
Commandant of
Arty. No. 5268,
dated 9th Septem-
ber 1859.*

*Order of Govern-
ment No. 3235, 9th
September 1859.*

The Inspector General will give all information when forwarding subjects for investigation.

1st. The In-
spector General
when placing sub-
jects before the
Permanent Ar-
tillery Select
Committee, will
furnish at the
same time all in-
formation bearing
on the several sub-
jects which may
be on record in
his Office.

In all other cases the Se-
cretary of the Committee
will communicate with the
Inspector General, with
the view to information
being provided, if neces-
sary.

2nd. In the case of all other sub-
jects received by the Committee through
the Commandant of Artillery, (the only
other channel by which papers reach
the Committee) a Memo: of the same
is to be sent by the Secretary of the Committee to the In-
spector General, with the view to the Committee being pro-
vided from his office, with all the necessary information on
record there, connected with the subjects for investigation.

The Inspector General
whenever he may dissent
from the opinion of the
Committee, will return the
Proceedings for reconsi-
deration.

3rd. That whenever the Inspector
General may dissent from the opinion
of the Committee, he will return the
Proceedings in question, with additional
information, if any be requisite, for reconsideration in con-
nection with his views: after which, the Proceedings will
be finally reforwarded to him, for transmission to Govern-
ment, through the established channels of the Commandant of
Artillery, and His Excellency the Commander in Chief.

Everything that a Member when debarred from voting under G. O. G. 23rd June 1846, may have to say, is to be heard, and he is also to be allowed to enter a Minute before the Committee proceed to record its opinion.

* *

<i>Extract from</i> <i>Memo: by Com-</i> <i>mandant of Artil-</i> <i>lery dated 30th</i> <i>September 1859.</i>	}	The Command- ant of Artillery requests the Com- mittee to observe. <div style="text-align: center;">* *</div>
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(a.) *Meeting 205.* } 2ndly. that with reference to Clause i.^(a.)
Article 810. } Rule VI, of Rules of Procedure, and
 the 2nd Para. of the Adjutant General's letter ^(b.) above
^(b.) *No. 5268, 9th* } referred to, not only is every thing which
September 1859. } a Member of the Committee, whenever
^(c.) *Under operation* } debarred from voting ^(c.) may have to
of G. O. G. No. 140, } say, to be heard; but provided he in-
dated 23rd June } timate a wish to enter a Minute, a rea-
1846. } sonable time also is always to be allow-
 ed him for that purpose, before the Committee proceed to
 frame and record its opinion on the subject under investiga-
 tion. For this purpose he is to be called upon to state his
 intention, and his reply is to be recorded in the affirmative
 or the reverse as the case may be.

MEETING 206.

**EXTRACT FROM THE PROCEEDINGS OF THE MADRAS PERMANENT SE-
 LECT COMMITTEE OF ARTILLERY OFFICERS, ASSEMBLED BY ORDER OF
 COLONEL P. HAMON, BRIGADIER COMMANDANT OF ARTILLERY.**

Artillery Depôt, Saint Thomas' Mount, 26th October 1859.

PRESENT.

LIEUT. COL. W. H. MILLER, *Commandant Artillery Recruit Depot.*
 LIEUT. COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*
 LIEUT. COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 LIEUT. COL. G. ROWLANDSON, *Superintendent Gun Powder Manufactory.*
 MAJOR B. W. BLACK, *Director Artillery Depot.*
 LIEUT. COL. J. L. BARROW, *Acting Principal Commissary of Ordnance.*
 CAPTAIN E. H. COUCHMAN, *Assistant Adjutant General of Artillery.*
 CAPTAIN J. Mc. K. MACINTYRE, *S. O. in Charge Head Qrs. 5th Battn. Arty.*
 CAPTAIN G. C. ROBINSON, *1st Battalion Artillery.*

ARTICLE 811.

ON PROPOSED ELONGATED EXPANDING SHOT FOR ORDNANCE,
PLATE 124.

[a] No. 1355
8th June 1859.
[b] dated 6th
May 1859.

The Inspector General of Ordnance and
Magazines forwards ^(a) for submission to
the Select Committee a letter^(b) from Mr. John Heap, Me-
chanical Engineer, Madras, to the Principal Commissary of
Ordnance, accompanied by a model of an elongated expan-
ding Shot proposed by him, and a Memorandum descriptive
of its construction.

MEMO.

16th April 1859.

*Elongated expanding Shot for Ordnance rifled, by Mr. J.
Heap.*

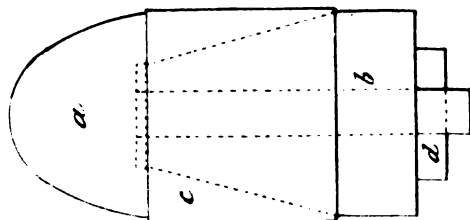
The Shot is constructed in four parts, namely, two pieces
of cast iron, one wrought iron, and one of lead.

2nd. The cone and spindle, is of cast iron, having a co-
nical lead cylinder on the spindle, the base is cast iron having
a cone which is inserted into the lead ring, the base on the
explosion of the cartridge moves forward about $\frac{1}{4}$ inch, and
expands the lead sufficient to fill the grooves, thus destroying
all windage, and causing the full force of the charge to act
on the ball, the range must be therefore greater than that
of the Spherical ball.

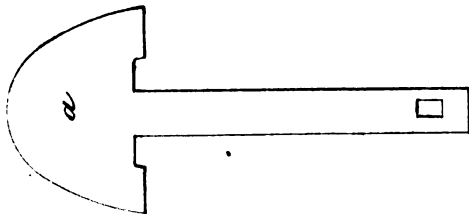
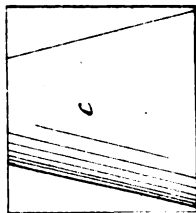
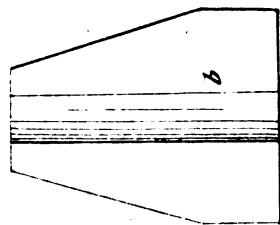
3rd. This ball will also have a similar rotary motion to
that of the Enfield rifle bullet, and will carry true—the
head being heavier than the base—If a few balls were made
up from Gun-metal, a satisfactory trial could be carried out,
and place the supposed merits of the shot beyond a doubt;
should there be no rifle ordnance in store, I shall be happy to
superintend the rifling of a gun that will answer for the elon-
gated ball—A striking advantage appears in using this shot
which can be brought up to any desirable weight for a Light
Field piece, which cannot be done in the case of the
common round shot—I would therefore suggest its being

Meeting 206, Article 811.

Elongated expanding Shot proposed by M^r Heayn Mech^l Eng^r.



S e c t i o n s



$\frac{1}{3}$ Size.

tried with a smooth bore gun, as a considerable reduction in windage will take place by the expansion of the lead ring, and cause a greater range than that obtained from the common shot.

4th. Having recently seen in the "Home News" an account of the French having introduced rifle guns into their service loading from the muzzle, and that the advantages expected from them when in action was considerable, I was induced to turn my thoughts to the construction of a shot that would have the same advantages, if not more, than that adopted by the French Army, and which can be used in the usual manner.

5th. The model of the shot now forwarded presented itself to my mind, and I feel so confident of it succeeding, that should it not meet with a fair trial at an early period here, I beg it may be returned to me with a view to its being sent to England to the Royal Arsenal for experiment.

(Signed) JOHN HEAP

Mechanic

P. S. Should the projection of the bolt and key at the base be considered objectionable, I am prepared to alter that portion by their removal.

The Committee on reconsideration of this subject in connection with remarks of the Acting Inspector General of Ordnance on the original opinion of the Committee, as communicated to them in his Memorandum, Ordnance Department No. 7181, dated 21st November 1859, now record the following.

REVISED OPINION.—Mr. Heap's proposition has been unavoidably submitted in a vague and unsatisfactory form for want of sufficient data in regard to the proposed weight of Shot &c., but the Committee consider that there is sufficient promise in his ingenious suggestion to render a trial desirable, and therefore recommend that 20 shot of his proposed

pattern be prepared to suit the brass 9 Pdr. Field Gun that was rifled in the Grand Arsenal in 1857, which the Inspector General intimates is now available, preliminary to the consideration which will hereafter be necessary in respect to the required proof of the Gun and the charge to be used with the shot.

30th November 1859.

Observation of the Inspector General on Article 811.—The Acting Inspector General of Ordnance and Magazines concurs in the opinion recorded by the Committee on the above Article, relative to the making up, experimentally, of 20 shot after the model prepared by Mr. Heap of the Bullet Factory.

ARTICLE 812.

ON A FAILURE OF THE ELEVATING SCREWS OF CERTAIN LIGHT FIELD CARRIAGES.

(a) No. 569
16th May 1859.

The Inspector General of Ordnance and Magazines requests^(a) that the subject of the failure of the Elevating Screws of certain 9 Pdr. Light Field Carriages contained in the undermentioned documents may be submitted for the opinion of the Select Committee.

(b) Dated
2nd April 1859.

1.—*Proof Report* ^(b) of 9 Pdr. *Established pattern Carriages.*

(c) No. 12507
15th April 1859.

2.—*Extract* ^(c) of *Proceedings of the Inspector General of Ordnance and Magazines.* Fowards letter from the Superintendent Gun Carriage Manufactory on the remarks contained in proof report, relative to Elevating Serews of 9 Pdr. Light Field Carriages.

(d.) No 203
9th April 1859

3.—*Letter* ^(d.) from the Superintendent Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines.—States “ that on

“ the receipt of the Elevating Screws, the failures at the
 “ Capstan heads were carefully investigated and there was
 “ no fault to be found either in the workmanship or materi-
 “ al, both being excellent. They were one and all
 “ only bent, but without any fracture.”

“ From the circumstance of one of the screws being
 “ bent, it must be evident that the material was good, but
 “ the diameter of the screw is not sufficient to withstand the
 “ violent shock of firing. The screw is $1\frac{1}{4}$ inches in diame-
 “ ter according to the Established pattern and the same as
 “ those in other carriages—I can see no other cause for
 “ their bending than the violent action of the powder.

“ The remedy I would suggest is to revert to the diameter
 “ of $1\frac{3}{4}$ inches elevating screw.”

(c) No. 174
 9th May 1859.

4.—*Letter (c.) from the Brigadier Com-
 mandant of Artillery to the Inspector Gene-
 ral of Ordnance.*—Considers it advisable before proposing
 any alteration, that the subject be submitted for the consi-
 deration of the Madras Permanent Select Committee of Ar-
 tillery Officers, as the records of the Artillery Depot only
 exhibit instances of two screws of the present diameter ($\begin{smallmatrix} \text{inches.} \\ 1\frac{1}{4} \end{smallmatrix}$)
 having failed, in addition to those now reported on since
 their introduction.

OPINION.—The Committee recommends that the remedy
 suggested by the Superintendent of the Gun Carriage Manu-
 factory, namely, of reverting to screws of $1\frac{3}{4}$ inch diameter,
 be adopted, but that care be taken that the increased perfor-
 mation be made, not in the beam, but in the Elevating screw
 box.

*Observations of the Acting Inspector General of Ordnance
 on Article 812.*—The Acting Inspector General of Ordnance
 and Magazines concurs in opinion with the Select Committee
 on this subject.

ARTICLE 813.

ON THE ADOPTION OF ADDITIONAL NAVE HOOPS TO THE
WHEELS OF THE MADRAS HEAVY FIELD CARRIAGES.

(a.) No. 3950
10th August 1859

(b.) No. 622
5th August 1859.

The Acting Inspector General of Ordnance forwards (a.) a letter (b.) from the Superintendent of the Gun Carriage Manufactory, suggesting the adoption of 4 instead of 2 Nave hoops to the wheels of Heavy Field Carriages, and requests the question may be submitted to the Artillery Select Committee.

OPINION.—The Committee quite concurs with the Superintendent of the Gun Carriage Manufactory in the propriety of adopting the additional Nave bands on the wheels of the Heavy Field Carriages, and further recommend, that the old system of fastening the bands by screws or nails through them be reverted to, in place of the studs on the outside.

Observations of the Acting Inspector General of Ordnance on Article 813.—The Acting Inspector General of Ordnance and Magazines concurs in opinion with the Committee.

ARTICLE 814.

A PROPOSAL TO CAST IRON PIVOTS FOR GARRISON PLAT-
FORMS HOLLOW INSTEAD OF SOLID.

(a.) Extract Pro-
ceedings No. 5491
23rd September 1859.

(b.) No. 752.
21st September 1859.

The Acting Inspector General of Ordnance forwards (a.) for submission to the Select Committee copy of a letter (b.) from the Superintendent of the Gun Carriage Manufactory containing a suggestion made by Mr, Scott, European Founder, that cast iron Pivots for Garrison Platforms should be made hollow and not solid, as it would add to their strength and also reduce the quantity of metal.

OPINION.—The Committee concurs in the suggestion, and recommends the adoption of hollow instead of solid cast iron pivots for Garrison Platforms.

Observations of the Acting Inspector General of Ordnance on Article 814.—The Acting Inspector General of Ordnance and Magazines concurs in the opinion recorded by the Artillery Select Committee on this subject.

ARTICLE 815.

ON AN ALTERATION IN THE SIDE FRAMES OF AMMUNITION WAGGONS.

[a.] Meeting 201
Article 797.
Artillery Records.
page 728.

With reference to the recommendation of the Select Committee at a former Meeting, [a.] the undermentioned documents, and also an Established pattern Waggon altered as suggested, are submitted for their final decision.

[b.] No. 203
4th June 1859.

1. *Letter [b.] from the Brigadier Commandant of Artillery to the Inspector General of Ordnance.*—Suggests that instructions be given to the Superintendent of the Gun Carriage Manufactory to alter an Established pattern Waggon as recommended in Meeting 201 Article 797.

[c.] No. 1513
10th June 1859.

2. *Letter [c.] from the Inspector General of Ordnance to the Superintendent of the Gun Carriage Manufactory.*—Directing an Established pattern waggon being altered as recommended and forwarded to the Mount for submission to the Select Committee for final decision.

Order of Government
No. 1753
dated 16 May 1859
" Final decision
" awaited."

OPINION.—Referring to Article 797 at Meeting 201. and the orders of Government as per margin, the Committee on inspecting a Waggon altered as proposed, now approve of side framings of the dimensions and pattern before them, and accordingly it is recommended that this construction be followed hereafter.

2. Although framings of the dimensions now proposed cannot be conveniently introduced in the case of Waggon now in use, yet as it is desirable to strengthen the Waggon

in this respect, the Committee further recommend that those side framings which are of teak be removed and replaced by others of the same dimensions and pattern, but of Peddowk or Saul.

Observations of the Acting Inspector General of Ordnance on Article 815.—The Acting Inspector General concurs in opinion with the Committee that the side framings of the Light Field Waggon should in future constructions be of the dimensions and pattern proposed, but he doubts both the expediency and the practicability of removing all the Teak side framings of Waggon now in use with the Regiment for the purpose of replacing them by others of the same dimensions and pattern, but of Peddowk or Saul wood.

Observations of the Brigadier Commandant of Artillery on Article 815.—I concur in the opinion expressed by the Inspector General of Ordnance.

Orders of Government on Article 815.—The Governor in Council concurs with the Brigadier Commandant of Artillery and Inspector General of Ordnance, and sanctions the alterations proposed in all future constructions.

ARTICLE 816.

ON A NEW METHOD OF FASTENING AMMUNITION BOXES TO THE FRAMINGS OF WAGGONS AND LIMBERS, PROPOSED BY CONDUCTOR HENNESSY. PLATES 125 AND 126.

[a.] No. 3489
29th July 1859.

The Inspector General of Ordnance and Magazines forwards [a.] the undermentioned documents for submission to the Select Committee.

[b.] No. 991
12th July 1859.

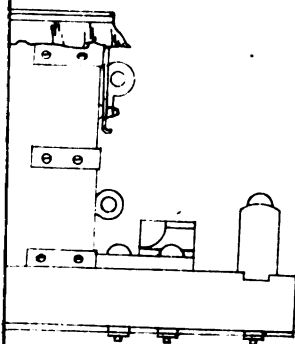
1. *Letter* [b.] *from the Commissary of Ordnance Secunderabad to the Inspector General of Ordnance.*—Forwards “ two drawings, shewing “ Conductor Hennessy’s proposed method of fastening Am- “ munition Boxes on to the side framings of Waggon, and “ centre framings of Limbers, by means of stout leather

ittee. Plate 125.

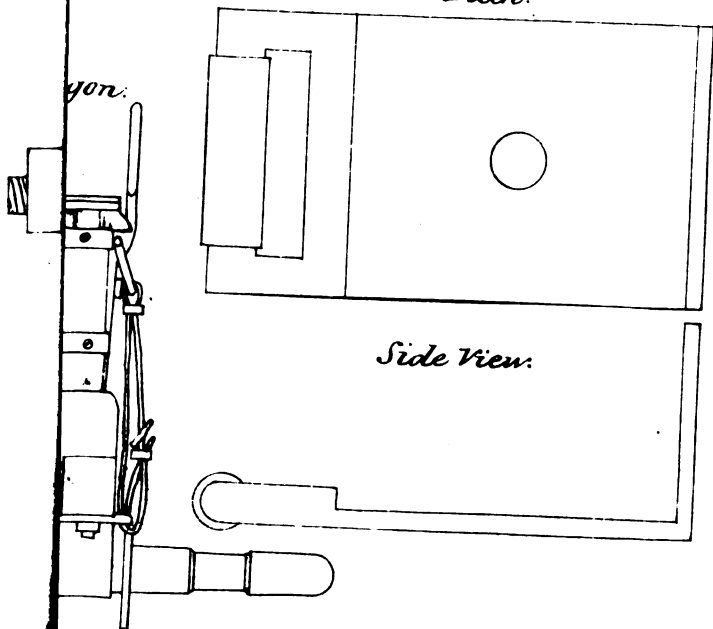
16.

y Leather Straps;

gon.



Under-plate
Plan.



Side View:

e.

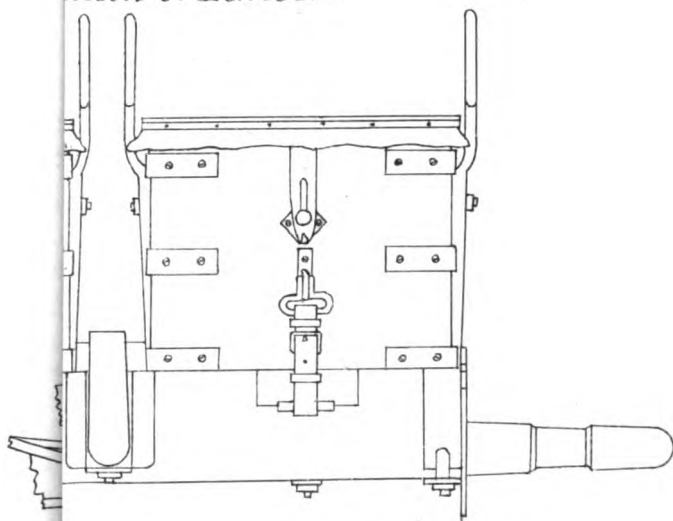
Plate 126.

6.

s by Leather Straps.

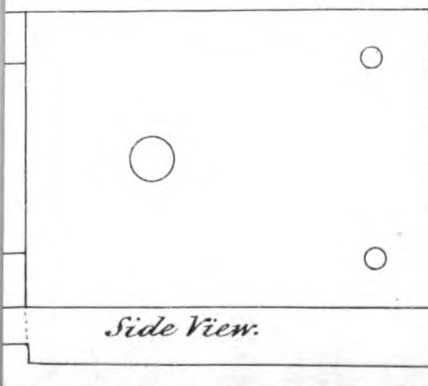
sy.

ation of Timber.



Under-plate.

Plan.



Side View.

“ Straps, Buckles, Shackles and Loops,” which he considers, “ in all respects superior to the present one of lashing on the Boxes with seized line. The advantages being perfect security, compactness, and ease with which the boxes can be fastened on or unloosened, besides economy in the saving of Seizing line, which is expensive and cannot be had “ at all times of good quality.

OPINION.—The Committee have recently had this subject under consideration and are decidedly of opinion, as recorded on a former occasion, that leather straps on the Carriages of a Battery have many objections, to which rope and other lashings are not liable in this climate, and therefore see no reason for disturbing the present arrangement in this respect.

Observations of the Acting Inspector General of Ordnance on Article 816.—The Acting Inspector General of Ordnance and Magazines concurs in opinion with the Committee, that it would be unadvisable to substitute leather straps in place of rope lashings to secure the Ammunition Boxes to the framings of Light Field Limbers and Waggons.

MEETING 207.

EXTRACT FROM THE PROCEEDINGS OF THE MADRAS PERMANENT SELECT COMMITTEE OF ARTILLERY OFFICERS, ASSEMBLED BY ORDER OF COLONEL P. HAMOND, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot, Saint Thomas' Mount, 22d. December 1859.

PRESENT.

LIEUT. COL. W. H. MILLER, *Commandant Madras Artillery Recruit Depot.*
 LIEUT. COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*
 LIEUT. COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 MAJOR B. W. BLACK, *Director Artillery Depot.*
 MAJOR J. BABINGTON, *5th Battalion. Artillery.*
 LIEUT. COL. J. L. BARROW, *Acting Principal Commissary of Ordnance.*
 CAPTAIN E. H. COUCHMAN, *Assistant Adjutant General of Artillery.*
 CAPTAIN, J. Mc K. MACINTYRE, *5th Battalion Artillery.*

ARTICLE 817.

ON THE BEST METHOD OF FIXING TIN COLLARS AND GRUMMETS TO SHOT AND SHELL.

* No. 11626
dated
28th March
1859.

With reference to the annexed Extract from the observations* of the Inspector General of Ordnance and Magazines on Meeting 194, dated 13th June 1857, the above subject is again laid before the Committee, by order of the Brigadier Commandant of Artillery.

EXTRACT.

ARTICLE 751.*—"There is much professional interest attaching to this question and I recommend the Committee should be directed to carry on experiments energetically so as to arrive at some practical results within a reasonable time. The assistance of the Principal Commissary of Ordnance and of the Superintendent of the Gun Carriage Manufactory will be readily placed by the Inspector General at their service for this purpose."

OPINION.—On a question of so much importance, the Committee consider that there is not yet sufficient information to enable them to arrive at a satisfactory conclusion, and also understanding that Captain Campbell has prepared a number of shot and shell in modification of his original plan, they recommend that instructions be sent to Bangalore for the transmission to the Mount of the shot and shells referred to, for a series of experiments to be conducted by the Committee in communication with Captain Campbell who is now on duty at the Presidency.—And further, as it appears very desirable to ascertain how far the plan of fixing bottoms by a metal rivet, adverted to in the Papers received from Woolwich, has been found to answer, that a letter be addressed to the Officer Commanding the Royal Artillery for information on this point.

* Artillery Records Page 559.

Observations of the Acting Inspector General of Ordnance on Article 817.—The Acting Inspector General of Ordnance and Magazines is of opinion that the Royal Artillery method of fixing bottoms to shot should be adopted in the Madras Artillery.

ARTICLE 818.

ON THE BREAKING DOWN OF CERTAIN SICK CARTS RECENTLY IN USE WITH THE 7TH REGIMENT N. I.

(a.) No. 3598,
30th July 1859.

The Acting Inspector General of Ordnance and Magazines forwards ^(a) the undermentioned documents with a view to the opinion of the Select Committee being obtained on the adoption of the remedy proposed by the Superintendent of the Gun Carriage Manufactory by increasing the scantling of the wood work, and the dimensions of the iron work of the Sick Cart.

(b.) No. 55
27th February 1859.

1. *Letter* ^(b) *from the Assistant Surgeon 7th Regiment N. I. to the Superintending Surgeon H. S. Force.*—Reports, “ that in the course of the “ second march from Secunderabad made by the 7th Regiment “ N. I. one spring of one sick cart, and one iron support of “ the Driver's seat gave way.—That in crossing the Godavery “ another spring was broken, and in passing over the Nirmul “ Ghat the wood work supporting a spring gave way ; on the “ first occasion the road was reasonably good.

(c.) No. 299
14th April 1859.

2.—*Letter* ^(c) *from the Superintendent of the Gun Carriage Manufactory to the Acting Inspector General of Ordnance and Magazines.*—States “ that although the road, on the first occasion it is “ said, ‘ was reasonably good’ it is very probable that in “ crossing the bed of the river Godavery, and passing over “ the Nirmul Ghat caused the two last failures which took “ place ; the test of carrying them over such difficult places “ being too much for the Sick Carts.—The same observation “ may be applicable for the failure on the first occasion also,

“ for although the Roads may be tolerably good, yet the
 “ Sick Cart might have accidentally come in contact with
 “ some obstruction on the road so as to cause it to give way.”

“ The only remedy appears to make these Sick Carts in
 “ future of greater strength by increasing the scantling of
 “ the wood work and the dimensions of Iron works—but
 “ this will make them heavier both in weight and draught.”

(d.) No. 285
 12th July 1859.

3. *Letter^(d) from the Superintending
 Surgeon H. S. Force, to the Commissary
 of Ordnance H. S. Force.*—States, that it appears to him,
 on an inspection of the Sick Cart used by the 7th Regiment
 N. I. “ it would be impossible to add to the strength of the
 “ materials without rendering the vehicle extremely cum-
 “ brous—A carriage that should combine lightness with
 “ strength is what is required for the comfort of the Sick,
 “ and to be adapted to the roads of India.”

OPINION.—The Committee consider that it is not possible
 to increase the Scantling of timber and dimensions of iron
 work used in the construction of Sick Carts without making
 these conveyances too cumbrous for use.—It is no matter of
 surprize to the Committee that springs break over such a
 road as that through the Neermul Jungle, or in passing over
 the bed of the Godavery, where that river is crossed en route
 from Secunderabad to Kamptee.

*Observations of the Acting Inspector General of Ordnance
 on Article 818*—The Acting Inspector General of Ordnance
 and Magazines differs in opinion with the Select Committee,
 and considers that the disadvantage of a slight increase in
 weight consequent on the increased scantling of the Timber
 and dimensions of Iron work, would be far more than com-
 pensated by the increased strength and durability of the Sick
 Cart.

(d.) No. 246
 12th March 1860.

*Observations of the Commander in Chief
 on Article 818, in letter^(d) from the Adjutant
 General of the Army Fort Saint George, to the Secretary 10*

Government, Military Department.—Having had experience of the *track* (it is not a road) through the Nirmul Jungle, the Commander-in-Chief agrees with the Committee, that the breaking of the Sick Cart is not to be wondered at; and His Excellency considers that no necessity has yet been shewn, for adding to the already too great weight of the Sick Carts now in use.

Orders of Government on Article 818.—The Governor in Council concurs in the opinion expressed by the Commander in-Chief and Committee.

ARTICLE 819.

ON THE INTRODUCTION OR OTHERWISE OF TARPAULINS FOR WAGGONS AMMUNITION AND FOR LIMBERS, AS ARTICLES OF EQUIPMENT OF BATTERIES.

(a.) No. 7105
17th November 1859. The Acting Inspector General of Ordnance forwards ^(a) copy of correspondence below mentioned for submission to the Select Committee.

(b.) No. 112
19th October 1859. 1.—*Letter^(b) from the Commissary of Ordnance Nagpore Force to the Acting Inspector General of Ordnance.*—Requests to be informed, whether, on account of Tarpaulins Waggon Ammunition, and Tarpaulins Limber Gun, not being included in the allotment laid down on the 1st January 1858, for Field Batteries, he is to go on making up any tarpaulins of these dimensions; or to supply them, if called upon to do so.

(c.) No. 6807
7th November 1859. 2.—*Letter^(c) from the Acting Inspector General of Ordnance to the Brigadier Commandant of Artillery.*—Forwards the above letter ^(b) in Original, and requests opinion on the subject.

(d.) No. 419
10th November 1859. 3.—*Letter^(d) from the Brigadier Commandant of Artillery to the Acting Inspector General of Ordnance.*—States, that as the cartridges are

in copper boxes, and tarpaulins would be most inconvenient for Horse Batteries when men are mounted on Waggon and Limbers, and they have been discontinued in the Equipments of the Royal Artillery, he does not perceive the necessity of again establishing them in the Batteries of the Madras Army.—Suggests the question be considered by the Select Committee.

OPINION.—The Committee are of opinion that Tarpaulins Limber and Waggon, are necessary articles of Equipment for all Batteries when in movement, whether in the Field or from Station to Station.—But Tarpaulins should not, as was formerly the practice, be in constant use; they should be carefully preserved in the Battery Stores to be brought into use on occasions of bad weather or exposure of the Carriages in Park.

Observations of the Acting Inspector General of Ordnance on Article 819.—The Acting Inspector General of Ordnance and Magazines concurs in the opinion of the Select Committee relative to the preservation of Tarpaulins in use with a Battery.

ARTICLE 820.

ON A SUGGESTION TO LINE SLOW MATCH BOXES WITH ZINC INSTEAD OF COPPER.

(a) No. 7406
26th November 1859.

The Acting Inspector General of Ordnance requests ^(a) that the above suggestion of the Acting Commissary of Ordnance Bangalore, with the

“ I believe zinc would equally answer the purpose intended—perhaps it may be considered better than tin, their respective fuzing temperatures being as 770° to 410° Fahrenheit or thereabout.”

Extract as per margin, from that

Officer's report on the subject may be submitted to the Artillery Select Committee.

OPINION.—The Committee fully concur in the expediency of adopting the suggestion of the Commissary of Ordnance at Bangalore, of substituting Zinc for Copper Sheet as lining for the Slow match boxes on the Light Field Carriages.

Observations of the Acting Inspector General of Ordnance on Article 820.—The Acting Inspector General of Ordnance and Magazines concurs in the proposition of the Select Committee relative to the substitution of Zinc for copper sheet for lining the Slow match boxes on the Light Field Carriages.

ARTICLE 821.

ON TWO CARRIAGES IRON FOR 10 INCH IRON HOWITZERS, LIEUTENANT COLONEL MAITLAND'S PATTERN, FITTED WITH BRASS COLLARS TO ADAPT THEM FOR 8 INCH IRON HOWITZERS.

[a.] No. 650
23rd November 1859.

The Acting Inspector General of Ordnance and Magazines requests [a] that the above mentioned Carriages may be submitted to the Select Committee with the view to their recording an opinion of the efficiency of the mode of adapting the Carriages to suit both calibres.

The undermentioned documents are laid before the Committee.

[b] No. 6462
26th October 1859.

[c] No. 812
21st October 1859.

1.—*Letter*^[b] *from the Inspector General of Ordnance, forwarding copy of a letter*^[c] *from the Superintendent of the Gun Carriage Manufactory*—in which is stated that the Carriages had not been altered, but only the trunnion holes fitted with brass collars to suit the 8 inch Howitzer.

[d] dated
25th October 1859.

2.—*Proof Report*^[d] *of two 10 Inch Iron Howitzer Carriages adapted for 8 Inch Howitzers.*

OPINION.—One of these Carriages for 10 Inch Iron Howitzers, mounted with an 8 Inch Iron Howitzer fitted with a pair of the Brass Collars submitted for report, having undergone, a further proof of 25 rounds at 15° elevation without inquiry to either collars or Carriage, the Committee approve of this method of making one carriage of the con-

struction before them answer for 8 Inch Howitzers as well as for the Howitzers 10 Inch.

2. As it was observed, however, during the Proof that the trunnions of the Howitzer revolved in the caps, instead of the caps, revolving with the trunnions in the trunnion holes, of the carriage, the Committee recommend that this be remedied by the caps being securely fixed to the trunnions by means of either bolts or screws, in such manner as the Superintendent of the Gun Carriage Manufactory may find most suitable for this purpose.

Observations of the Acting Inspector General of Ordnance on Article 821.—The Acting Inspector General of Ordnance concurs in the alteration recommended by the Select Committee.

MEETING 208.

EXTRACT FROM THE PROCEEDINGS OF THE MADRAS PERMANENT SELECT COMMITTEE OF ARTILLERY OFFICERS. ASSEMBLED BY ORDER OF COLONEL E. AMSINCK, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depôt. St. Thomas' Mount 18th January 1860.

PRESENT.

LIEUT. COL. W. H. MILLER, *Commandant Madras Artillery Recruit Depot.*
 LIEUT. COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*
 LIEUT. COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 MAJOR. B. W. BLACK, *Director Artillery Depot.*
 LIEUT. COL. J. L. BARROW, *Acting Principal Commissary of Ordnance.*
 CAPTAIN. E. H. COUCHMAN, *Assistant Adjutant General of Artillery.*
 CAPTAIN. J. McMACINTYRE, *5th Battalion Artillery.*
 CAPTAIN H. D. GLOAG, *5th Battalion Artillery.*

ARTICLE 822.

ON A NEW PATTERN ZINC BOX FOR CONTAINING FRICTION TUBES, PLATES 126 AND 127.

[a] No. 5695
3rd October 1859.

[b] No. 336
16th Sept. 1859.

The Acting Inspector General of Ordnance forwards [a] copy of a letter [b] from the Brigadier Commandant of Artillery, recommending the introduction of a new

ettee.

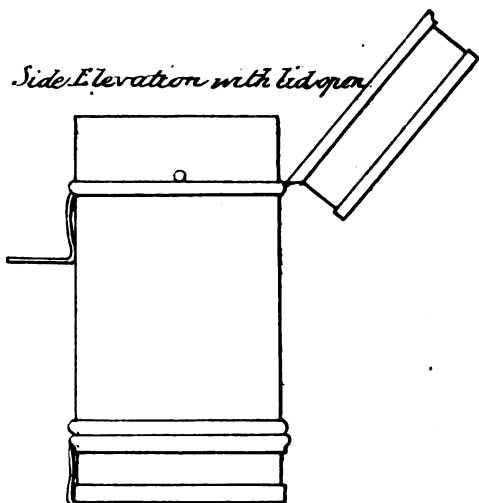
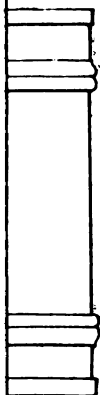
22.

Plate 126.

Friction Tubes.

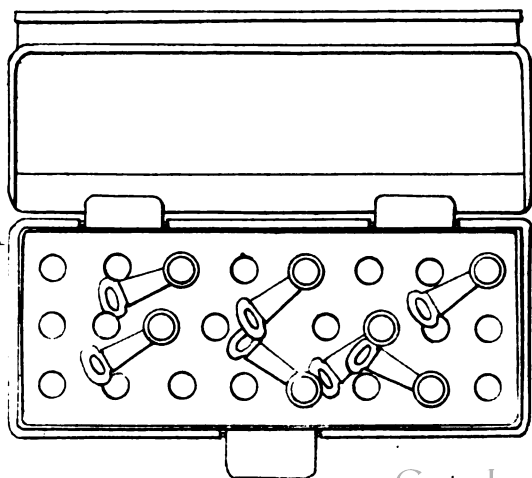
tion.

Side Elevation with lid open.



Plan with lid open.

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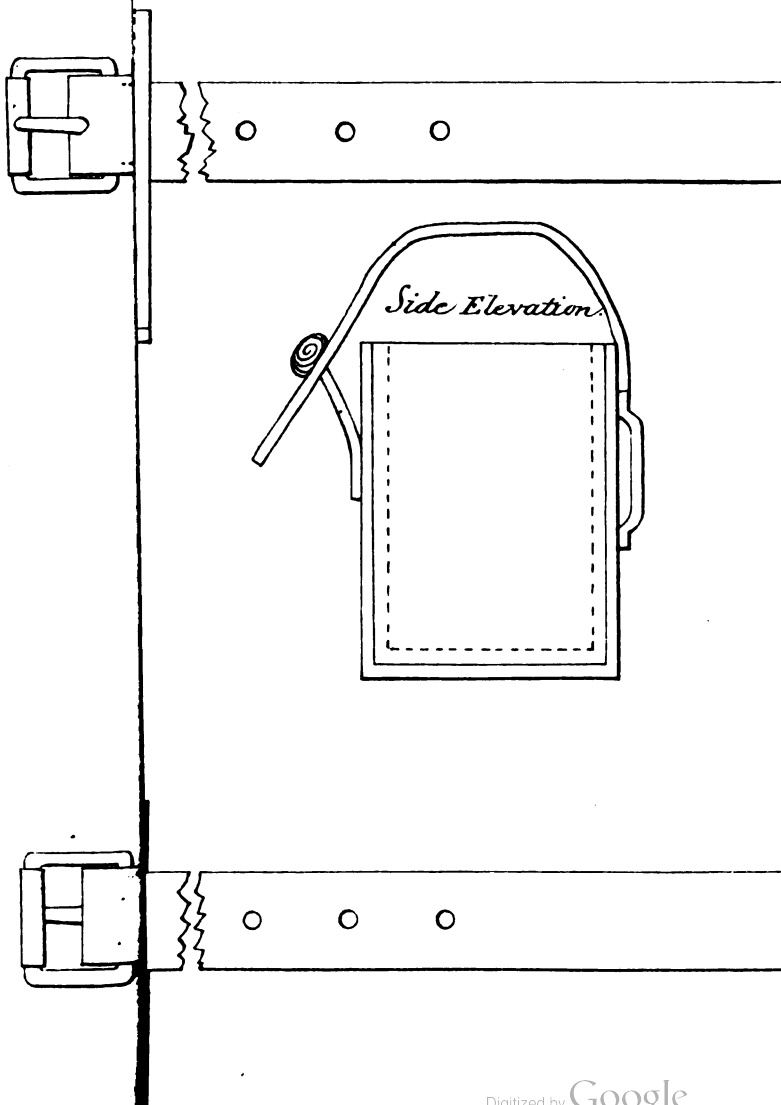


ittee.

22.

Plate 127.

Box for Friction Tubes.



pattern Zinc box for containing Friction Tubes, and requests the same may be submitted to the Select Committee.

The undermentioned documents are laid before the Committee.

(c) No. 2978
7th Novr. 1859.

1. *Letter^(c) from the Principal Commissary of Ordnance to the Acting Inspector General of Ordnance.*—Forwards for inspection a zinc case (made in the form of a pouch and adapted for slinging from a shoulder strap, or being attached to a waist belt) capable of containing 60 Friction Tubes, the idea of Overseer Lee.

(d) No. 7000
15th Novr. 1859.

2. *Letter^(d) from the Acting Inspector General of Ordnance to the Secretary Permanent Artillery Select Committee.*—Forwards copy of the preceding letter and pattern zinc case for holding Friction Tubes, prepared by Overseer Lee, for submission to the Artillery Select Committee.

At the last Meeting of the Committee, as it was conversationally suggested that a cylindrically shaped box was not so well adapted for packing as a rectangular one, the subject was withdrawn from consideration, to allow of a Box for Friction Tubes of the shape suggested being substituted for the cylindrical one then before the Committee.

A Box of the pattern contemplated opening at top and bottom, containing 50 Friction Tubes is laid before the Committee, together with an open pouch and belt proposed for use in action, with the box in question, in place of a "Box Tube" of the present pattern.

OPINION.—The Committee recommend the immediate adoption of the Box for Friction Tubes now before them, as very well adapted for the purpose of preserving the Tubes in Store, and for issue to Batteries to be carried in Ammunition boxes.

2. The box placed in an open leather pouch, apparently offers the further advantage of being well suited for use with a gun in action in place of the Tube boxes of existing pattern; but before finally suggesting its application in this way, the Committee recommend that two pouches of the pattern submitted, together with two boxes and a due

allotment of Tubes be sent for trial to the Officer Commanding Horse Brigade at Bangalore, and for report afterwards by that Officer, of proposed plan.

Observations of the Acting Inspector General of Ordnance on Article 822.—The Acting Inspector General of Ordnance concurs in the Committee's views relative to the adoption of the proposed pattern Box for Friction Tubes, and to the trial of the same with the open leather pouch, by the Officer Commanding Horse Brigade.

ARTICLE 823.

ON CHAINS LOCKING AND SHOES DRAG FOR FIELD CARRIAGES, PLATE 128.

[a] No. 5108
13th Sept. 1859.

The Acting Inspector General of Ordnance and Magazines forwards^[a] for submission to the Select Committee, a proposition from the Commissary of Ordnance Nagpore Force, for converting Chains Locking to Chains for Shoes Drag for Field Carriages.

[b] Meeting 198
Article 782
26th May 1858
Artillery Records
page 659.

Former Proceedings^[b] of the Committee on the subject are laid before them, and :—

(c) No. 711
6th Sept. 1859.

Letter ^[c] *from the Superintendent of the Gun Carriage Manufactory to the Acting Inspector General of Ordnance and Magazines.*—States that he sees no objection to the alteration suggested by Captain Laurie Commissary of Ordnance Nagpore.

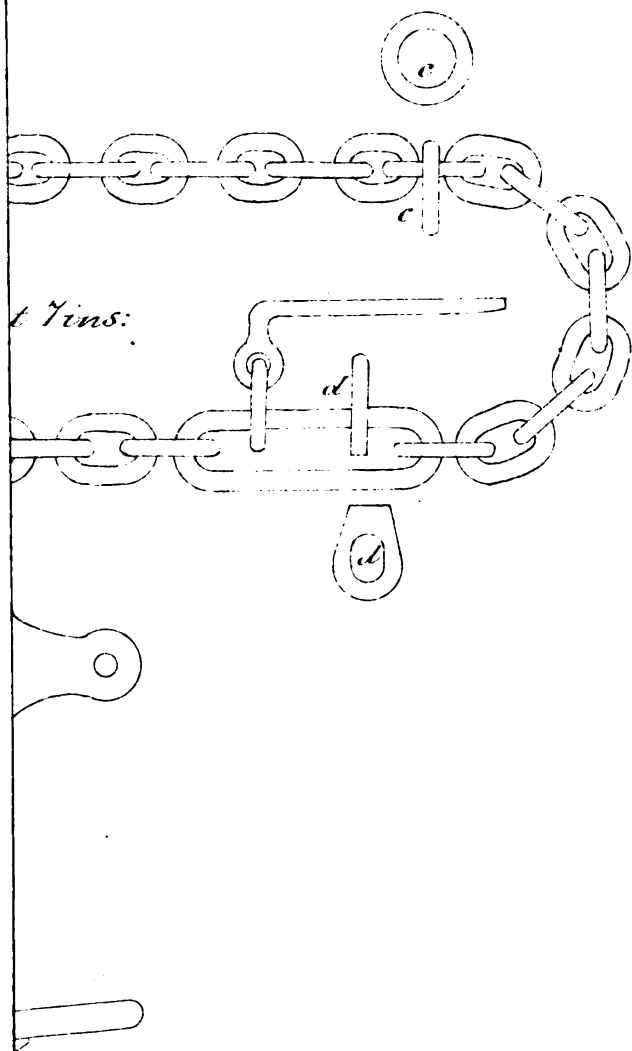
OPINION.—The Director of the Artillery Dépôt having at the request of the Committee altered a Chain Locking of the heavier pattern recently introduced (in supersession of the light pattern found to be inefficient) to the pattern in use with the Royal Artillery for Drag Shoes, with such modifications as make it suitable for the Drag Shoe of the Light Field Carriages of the Madras Artillery; and the chain having now been submitted, the Committee approved of the same, and recommend the immediate adoption of this pattern.

2. It is observed that for the purpose of carrying the new chain and drag Shoes, hooks calculated to support the

ittec.

Plate 428.

ght Field Carriages.



increase of weight must now be fixed to all carriages, under the same arrangement as those adopted in the Royal Artillery for the like purpose ; and the lighter hooks hitherto in use for supporting only the light Locking chain, now superseded, be removed.

Observations of the Acting Inspector General of Ordnance on Article 823.—The Acting Inspector General of Ordnance and Magazines concurs in the alteration of the Locking Chains proposed by the Select Committee.

Orders of Government on Article 823.—Approved.

ARTICLE 824.

ON THE ADVISABLENESS OF INCREASING THE DIMENSIONS OF THE IRON WORK OF LIGHT FIELD CARRIAGES.

(a.) No. 1566
11th June 1859.

The Inspector General of Ordnance and Magazines requests (a) the opinion of the Artillery Select Committee on a report on certain Light Field Carriages which required thorough repair four months after issue, in consequence it is supposed of insufficiency in the dimensions of the iron work.

The undermentioned correspondence is laid before the Committee.

(b.) No. 436
17th June 1859.

1. *Letter (b.) from the Officer Commanding Horse Brigade to the Commissary of Ordnance Bangalore.*—After detailing the work the carriages had been submitted to during the period referred to, states as his opinion that Strength has been sacrificed to lightness too much in the manufacture of the Light Field Carriages, and that this is the reason the carriages under report have failed :—feels convinced that a slight increase in the dimensions of the wood work would render the Light Field Carriages much more Serviceable than they are at present without making them too heavy for the purposes for which they are intended.

(c.) No. 705
24th June 1859.

2. *Letter (c.) from the Commissary of Ordnance Bangalore to the Inspector General of Ordnance.*—Is of opinion that the construction

of the carriages under reference is faulty.—“ The wooden parts, though separately strong, do not appear to give that mutual support which is required, the distance between the bolts connecting them, being much too great. The cheeks are not sufficiently bound to the body, to prevent their falling over outwards, when strong and unequal concussions are received, this is particularly observable in the 12 Pounder Howitzer Carriages, where only two bolts pass through the Cheeks and body.”

2nd. “ Also the Iron Trunnion Box Bands appear too much reduced in bulk, a greater body of metal under the trunnions would deaden the concussion upon the wood work and tend to preserve it.”

3rd. “ The wheels being of great diameter the Fellies are unavoidably much cut across the grain, and the length of the spokes renders them liable to spring and receive injury in passing over bad ground at a rapid pace.”

(d.) No. 512
24 July 1859.

3rd.—*Letter* ^(d) *from the Superintendent Gun Carriage Manufactory to the Acting Inspector General of Ordnance.*

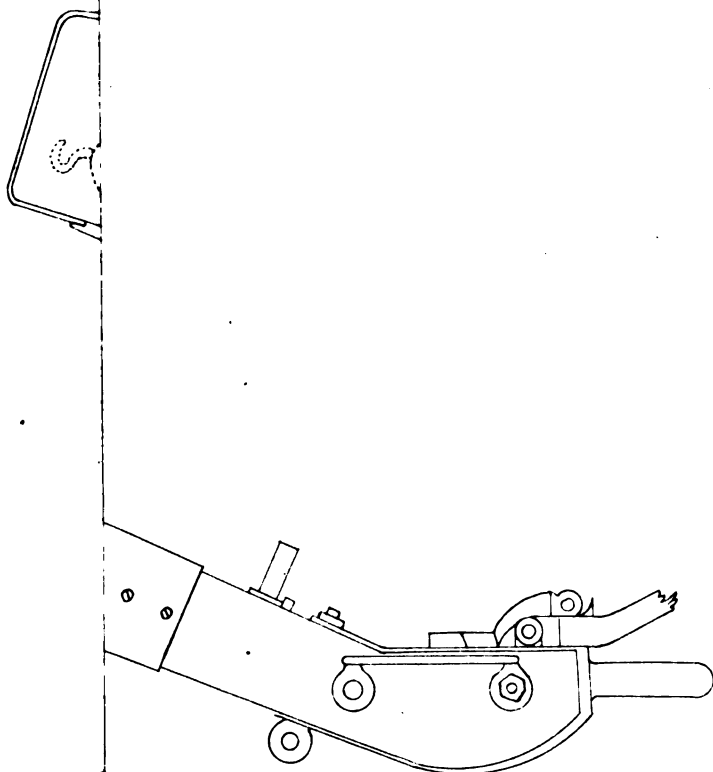
Agrees with the observations of the Officer Commanding Horse Brigade and Commissary of Ordnance Bangalore, that great reduction has been made in the Iron work and that we have sacrificed strength to lightness, but with regard to the wooden parts there has been no reduction at all, the beams and cheeks being exactly of the dimensions and pattern of the Bengal Artillery which the Superintendent was directed to adopt for the Established pattern. The felloes and spokes of the wheels in this Presidency are greater in scantling than the Bengal wheel, but the tire is the same.

Agrees with Captain Campbell Commissary of Ordnance Bangalore that the wooden parts are not sufficiently bound together by bolts to give them that mutual support which they really require, and therefore recommend that more bolts be introduced into the Carriages as represented in the accom-

tee.—
4.

Plate 129.

F^d Carriages.



Gun
Man

Signed/ J. Hattland, J.^r Col^l
Supt. Gun Carr. Manuf^y.

panying sketch* as well as to increase the thickness of the tire from $\frac{1}{2}$ to $\frac{3}{4}$ inch, and to have the Arms of the axletree bent as in all other Artillery Services.

The efficacy of bolts has been established beyond question in the case of Howitzer Carriages where they used formerly to give way at the housing of the Axletree, but the introduction of two bolts just in rear of Axletree case has effectually prevented these failures; though Carriages have since failed, the failure has never in any case been in that part of them:—The Superintendent therefore is of opinion that great safety from failure will be the result to the Carriages if his recommendation of additional bolts is adopted.

Would recommend that the Gun Beams should have humps similar to those of the Howitzer Carriages, which is the best way of meeting Colonel Burgoyne's views and at the same time we should assimilate to the practice in the Royal Artillery.

(c.) No. 506
12th July 1859

4.—*Letter (c.) from the Superintendent
Gun Carriage Manufactory to the Acting*

Inspector General of Ordnance.—Annexes a statement of the weights of the “Madras Established pattern Carriages” and the “Royal Artillery Carriages” and states that the Royal Artillery Carriages have six side bolts and they are

• Plate 129.

single.—In the sketch* forwarded, the distances between the bolts are the same as in

the Royal Artillery Carriages, but doubled in the case of the four last towards the trail.

Has been led to adopt double bolts from the practice which prevailed in the construction of the Old Block Trail Madras Carriages in which the bolts are arranged in the same manner, and from the Carriages having stood uncommonly well; is of opinion that the introduction of these bolts will be of immense benefit to Carriages whenever they are constructed of half beams.

• Plate 129.

No.	Madras Established Pattern Carriages.	Weights.		No.	Royal Artillery Carriages	Weights.		Difference.
		Cwt.	Qrs. lbs.			Cwt.	Qrs. lbs.	
1	6-Pounder. { Weight of Body.....	6	0 8	1	6-Pounder. { Weight of Body.....	6	1 12	
	Ditto " 2 Wheels....	4	1 16			3	3 20	
	Average Weight...	10	1 24					
	Probable Weight for additional Bolts, Nuts, and Plates.....	0	0 25½					
	Total...	10	2 21½		Total...	10	1 4	0 1 17½
1	12-Pounder. { Weight of Body.....	7	0 12	1	12-Pounder. { Weight of Body.....	7	1 8	
	Ditto " 2 Wheels....	4	1 12			3	3 18	
	Average Weight...	11	1 24					
	Probable Weight for additional Bolts, Nuts, and Plates.....	0	0 25½					
	Total...	11	2 21½		Total...	11	0 26	0 1 23½

GUN CARRIAGE MANUFACTORY, }
 (Signed) J. MAITLAND, Lieutenant-Colonel,

Madras, 12th July 1850.

Superintendent Gun Carriage Manufactory.

(f.) No. 3245
21st July 1859.

5.—*Letter (f) from the Acting Inspector General of Ordnance to the Secretary Artillery Select Committee.*—Forwards in original, the foregoing correspondence for submission to the Select Committee.

OPINION.—The Committee recommend that the Superintendent of the Gun Carriage Manufactory be instructed to to alter one Light Field Carriage for each description of Ordnance of the established pattern with reference to the particulars suggested in the correspondence before them; and that the four (a.) Carriages so altered be afterwards subjected to very severe proof by firing and travelling over bad roads.

(a.) Howitzer 24 Pdr.

Gun	12	"
"	9	"
"	6	"

Observations of the Acting Inspector General of Ordnance on Article 824.—The probability of great changes being early effected in the Ordnance equipment of the Presidency, renders it, perhaps, inexpedient that experiments involving expense, should be undertaken at the present time.—The Acting Inspector General is of opinion however, that the measure proposed by the Select Committee in this instance, is worthy of trial,

Observations of the Brigadier Commandant of Artillery on Article 824.—I agree with the Committee that the alterations should be made and the Carriages tested.

Orders of Government on Article 824.—The alterations proposed are sanctioned, the result being reported after trial.

MEETING 209.

EXTRACT FROM THE PROCEEDINGS OF THE MADRAS PERMANENT SELECT COMMITTEE OF ARTILLERY OFFICERS. ASSEMBLED BY ORDER OF COLONEL E. AMSINCK, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot, St. Thomas' Mount 4th February 1860.

PRESENT.

LIEUT. COL. W. H. MILLER, *Commandant Madras Artillery Recruit Depot.*

LIEUT. COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*

MAJOR C. J. COOKE, *Commanding 5th Battalion Artillery.*

MAJOR. B. W. BLACK, *Director Artillery Depot.*

LIEUT. COL. J. L. BARROW, *Acting Principal Commissary of Ordnance.*

CAPTAIN. J. McK. MACINTYRE, *5th Battalion Artillery.*

ARTICLE 825.

ON TWO PATTERN CARRIAGES FOR MOUNTAIN TRAIN ORDNANCE WITH CRANKED AXLES; AND THE ADDITION OF A SMALL STORE BOX FOR EACH MOUNTAIN TRAIN PIECE.

The undermentioned correspondence is laid before the Committee.

(a.) No. 11891
1st April 1859.

1.—*Letter (a) From the Inspector General of Ordnance to the Brigadier Commandant of Artillery.*—Forwards copy of a Memorandum prepared by Captain Cameron, particularizing the construction &c. of a Small Store Box to be carried on the top of the Limber Boxes of Mountain Train Ordnance.

(b.) No. 9038
21st January 1860.

2.—*Letter (b.) from the Inspector General of Ordnance to the Brigadier Commandant of Artillery.*—States that the Superintendent Gun Carriage Manufactory has been requested to send to the Mount, 2 pattern Carriages for Mountain Train Pieces with Cranked Axles, for submission to the Artillery Select Committee.

(c.) No. 9034
21st January 1860.

3.—*Letter (c) from the Inspector General of Ordnance and Magazines to the Superintendent Gun Carriage Manufactory.*—Directing 2-Batteries of Iron Carriages for Mountain Train 12 Pounders to be put in hand at once, the pattern of the Carriage Axles to be constructed will be communicated at an early date,

(d.) No. 9278
26th January. 1860.

4.—*Letter (d) from the Acting Inspector General of Ordnance to the Secretary Permanent Artillery Select Committee.*—States that the following Carriages have been directed to be sent to the Mount for submission to the Select Committee.—The questions for consideration are:—1st. “Whether the introduction of the “Crank Axle has so improved the stability of the Carriage, “by bringing the centre of gravity nearer the base, as to

“ justify its superceding the present pattern Carriage with
 “ straight axle.—” 2d “ Which of the three Carriages, the
 “ old pattern, or the new with cranked axle, or Captain
 “ Campbell's, the Select Committee consider best adapted
 “ for Service in China”.

“ Carriage Mountain Train of wood and iron
 “ Captain Campbell's pattern”..... 1

“ Carriage Iron Mountain Train Old pattern
 “ but with cranked axles on Captain Camp-
 “ bell's pattern”..... 1

(a.) No. 130
 7th April 1859.

5.—*Letter* ^[a] *from Director Artillery
 Depôt to the Officer Commanding Madras*

Artillery Penang.—Requests that a sketch of the small Store box for the Limbers of Mountain Train Ordnance, a descriptive account of stowing the small Stores, mode of securing the box &c. may be forwarded at earliest convenience—If opportunity offers one of the small Store Boxes might advantageously be sent to Artillery Head Quarters.

[J] No. 62
 10th August 1859.

6.—*Letter* ^[J] *from the Officer Commanding Madras Artillery Penang to the Director Artillery Depot.*—Forwards a Small Store Box introduced by 2d Captain C. Cameron and a List of the Stores carried therein—to which there are, in his opinion, some objections, and to the mode of carrying, the principal of which are :—

1st “ The Box being lashed on the top of the Limber
 “ some delay must occur before ammunition could be
 “ obtained to load the gun,”

2d.—“ The position of the box so much above the axle
 “ renders the Limber more liable to upset, an accident
 “ which from the shortness of the axle, frequently occurs on
 “ rough ground.”

3d.—“The box appears much larger than is absolutely necessary, as many of the Stores now contained in it might, he thinks be carried elsewhere”.

Thinks “it should be laid down as a Rule that though carried on the Limber Boxes whilst proceeding along a good road and level ground, the Small Store Box should be invariably carried by hand, over rough ground or in the immediate vicinity of an enemy”.

[g] dated
12th January 1860.

7.—*Letter* ^[g] *from Colonel R. C. Moore, C. B. Commanding Artillery Hyderabad Subsidiary Force to the Director Artillery Depot.*—Forwards Plan and Elevation of a portable Ammunition Box for 12 Pounder Howitzers Mountain Train:—deems wooden bottoms preferable to grummets, if secured to the Shells by a pin screwed into the Shell and riveted back on to a washer.—Strongly recommends that the head of the truck of the 12 Pounder Howitzer iron carriage be made square *above* the trail transom,—the truck as at present placed is constantly found turning directly across the line of draught, especially in heavy muddy ground and then the trail has to be lifted up and the truck placed in its proper position, thereby causing much detention, annoyance and useless labor.

[h] No. 545
29th August 1854.

8.—*Letter* ^[h] *from Lieutenant Colonel P. Hamond Secunderabad to the Director Artillery Depot.*—Reports upon experiments carried on at Secunderabad with a 5½ inch Mortar* and 4½ inch Howitzer mounted on Carriages for Mountain warfare, and considers it desirable that some pieces of this description should be kept in Store in all the Arsenals, not only for Mountain Services but for general purposes.

The following Carriages are also placed before the Committee.

1.—3 Pounder Mountain Train Iron Carriage with gun, of established pattern.—Axle of Carriage and axle of limber both straight.

2.—12 Pounder Howitzer Mountain Train Carriage, with Howitzer, constructed on Captain Campbell's plan of combining wood and iron:—axle of Carriage cranked but axle of limber straight.—Ammunition boxes of limber $4\frac{1}{2}$ inches lower than the boxes of the established pattern, yet still containing the same number of rounds each, viz. 6.

3.—12 Pounder Howitzer Mountain Train iron Carriage, Lieutenant Colonel Maitland's pattern,—Axle of carriage and axle of limber both cranked, and limber fitted with ammunition boxes of Captain Campbell's pattern.

Also, a Small Store Box for Mountain Train Pieces proposed by 2d Captain Cameron.

The Committee proceed to submit the Carriages to the following Proofs:—

1st. An ordinary Proof by firing 15 rounds, which resulted in shewing.

First.—an inconvenient increase in recoil.

Second.—a considerable diminution of range at point blank.

Third.—greater difficulty in laying the piece already inconveniently low.

Fourth.—liability to injury during recoil from greater proximity to the ground.

2nd, To two marches round the base and over the slopes of one of the hills at the Mount.

These trials were very severe upon the Carriages as the ground is as rocky and broken as may reasonably be expected the carriages will ever be subjected to in mountain warfare in any country. The carriages were taken along slopes, across nullahs, and over broken ground following each other as nearly as possible over the same obstacles.

The two Howitzers and their limbers were constantly upset, sometimes together, at other times the Howitzers or the Limbers only. Captain Campbell's limber (with straight axle) upset less frequently than Colonel Maitland's limber (with cranked axle) but his Carriage was more often overturned. The limber of the 3 Pounder (established pattern) was constantly upset—it appeared to have no stability whatever. The gun on the contrary was very seldom overturned, and then chiefly from being brought over by the overturning of its limber. It did not overturn by itself more than three or four times throughout the trial, and this occurred more easily when attached to its own limber than when limbered up on Captain Campbell's limber.

The superiority of Colonel Maitland's carriage over Captain Campbell's in travelling was manifest, as was that of the established pattern carriage over both; but Captain Campbell's limber with the straight axle proved preferable to Colonel Maitland's limber with the cranked axle.

It was found that with ropes attached to the Carriages or limbers, or even by the hand, men one at each wheel were able to prevent the carriages overturning, and whenever they were upset two men readily righted them.

The cranked axle of the limber (of Colonel Maitland's limber) broke twice, and the elevating screw of Captain Campbell's carriage, from being nearer the ground, was constantly coming in contact with stones and other obstacles, and was on one occasion bent so as to become unserviceable.

OPINION.—The advantages expected from cranking the axle do not appear to the Committee to counterbalance the disadvantages arising in the case of the carriage, *1st.* out of the risk of injury when in action resulting from increased proximity to the ground, *2ndly.* out of the greater difficulty in laying a piece already inconveniently low, *3rdly.* from the diminution of range at P. B. and at low elevations, and *4thly* from a greater recoil—and in the case of the limber, of bring-

ing the trail of the carriage when limbered up too close to the ground for travelling, subjecting the carriage and particularly the elevating screw, to injury from obstacles.

The Committee would further observe that although there is little on record regarding the want of stability in these carriages when in movement, it appears from information personally given by Members of the Committee that the defect is more in the limbers than the carriages, and the Committee while fully admitting the advantage that would undoubtedly result from remedying this defect are still disposed to think it has been over estimated in respect to carriages that can be so readily righted.

Under consideration of the disadvantages attendant on the introduction of cranked axles, the Committee are therefore of opinion that the Carriages of the present established pattern with straight axle should be continued in use, and that the present established pattern limber should be superseded

by that proposed by Captain
Campbell.*

* Plate 130.

The Ammunition Box recommended by Col. Moore, C. B., it is observed contains only 5 in place of 6 rounds of ammunition, which not only is a defect in itself, but obviously requires a greater number of Boxes for the conveyance of the allotment of Ammunition accompanying each piece.

The remarks by Colonel Moore on the inconvenience attendant on the truck wheel, when the Mountain Train Carriage unlimbered, is in hand-draught, although perfectly just as regards the pattern of truck first in use with a straight shank or pivot iron, do not apply now that the shank has been cranked to allow the truck to follow in rear of the pivot iron when in movement instead of immediately below it.

The Committee further recommend the introduction of a Small store or implement Box for each Mountain Train piece,

to contain the necessary instruments and implements, as suggested by 2nd Captain C. Cameron, but a box of the size recommended by this Officer is open to objections, the implement box to be conveyed by hand carriage ought not to exceed $14\frac{1}{2}$ inches square by $5\frac{1}{4}$ inches in depth, interior measurement, fitted with a Tray $2\frac{1}{2}$ inches deep, of a pattern which the Committee submit herewith.*

* Plate 130.

The allotment of Instruments and Tools to be conveyed therein and their distribution are specified in the annexed Lists.

This being the first occasion of Captain Campbell's principle of construction for Gun Carriages by combining wood with iron, being brought before the Committee, they are disposed to take a most favorable view of it; for although this combination may not be preferable to iron alone for Mountain Train Carriages, it holds out promise of much value in the construction of carriages for guns of the larger calibres.

MOUNTAIN TRAIN EQUIPMENT.

Contents of Ammunition Boxes for 12-Pounder or $4\frac{1}{2}$ Inch Howitzer.

No. 1. Front Box Limber.

Box small with Quick Match.....	No. 1	
Bits gun steel.....	No. 1	—In loop of Priming Pouch.
Cartridges Serge filled 12 ozs. each..	6	} In a Copper Box.
" " empty.....	2	
" Cloth filled bursting 5oz	4	
each.....		
" filled Priming with Cur-	1	
wah Covers, 1 lb.....		
Fuzes Driven.....	13	—Contained in a Canvass bag.
Pouch Priming.....	1	} With loop on each side for holding the Bit and Pricker.

Pricker.....	„	1	—In loop of Priming Pouch.
Scales Tangent Howitzer 12 Pdr.....	„	1	
Shells Iron Common Howr. 12 Pdr.			
Grummetted.....	„	4	
Shot Canister Tin filled	„	.....	2
Spikes ragged.....	„	1	} In pockets in front of Pri- ming Pouch.
„ spring.....	„	1	
Stocks Portfire.....	„	1	} Shortened to the breadth of the Box by reducing the length of the handle.

No. 2 Rear Box, Limber.

Box small with Quick Match.....	No.	1	
Cartridges Serge filled 12 ozs. each	„	6	} In a Copper Box.
„ „ empty.....	„	2	
„ Cloth filled bursting 5 ozs. each.....	„	4	
„ filled Priming with Cur- wah Covers, 1 lb.....	„	1	
Fuzes driven.....	„	12	—Contained in a Canvass bag
Portfires driven.....	„	10	} Cut to 14 $\frac{1}{2}$ inches in length to adapt them to the breadth of the Box.
Shells Iron Common Howr. 12 Pdr.			
grummetted.....	„	4	
Shot Canister Tin filled	„	„	2

N. B. The end of the Copper Box to be close to the right framing of each Ammunition Box, which will leave sufficient space at the opposite end for the Bag containing Fuzes, and the Box for Quick Match.

ARTILLERY DEPÔT,
SAINT THOMAS' MOUNT
4th February 1860.

B. W. BLACK, Major,
Secy. Permt. Select Committee of Arty. Officers.

MOUNTAIN TRAIN EQUIPMENT.

Contents of Implement Box for 12 Pdr. or 4½ Inch Howr.
In the bottom of Box.

Augers Fuze Brace	No.	1	Instruments.
Chalk	ozs.	4	
Compasses brass common	Pairs.	1	
„ Calibre brass	No.	1	
Drifts gun	„	1	
File saw	„	1	
Funnel copper powder	„	1	
Knives Laboratory... ..	„	1	
Mallets Fuze setting... ..	„	1	
Pincers brass fuze	„	1	
Rasps ½ round	„	1	
Saws dovetail... ..	„	1	
Setters Fuze	„	1	
Twine Europe fine... ..	ozs.	1	
Vices hand fuze... ..	No.	1	
Wax cloth	Yards.	1	

In the Tray.

Gimblets common	No.	1	Tools.
Hammers wrench	„	1	
„ with Turnscrew... ..	„	1	
Nails Iron	lbs.	1	
Pincers Iron common... ..	No.	1	
Pins Linch spare	„	1	
Ratline... ..	sks.	2	
Screws Iron 2—1½ and 1¼ inch	No.	18	
Washers spare	„	1	
Worms Gun or Howitzer	„	1	

ARTILLERY DEPÔT,
 SAINT THOMAS' MOUNT
 4th February 1860.

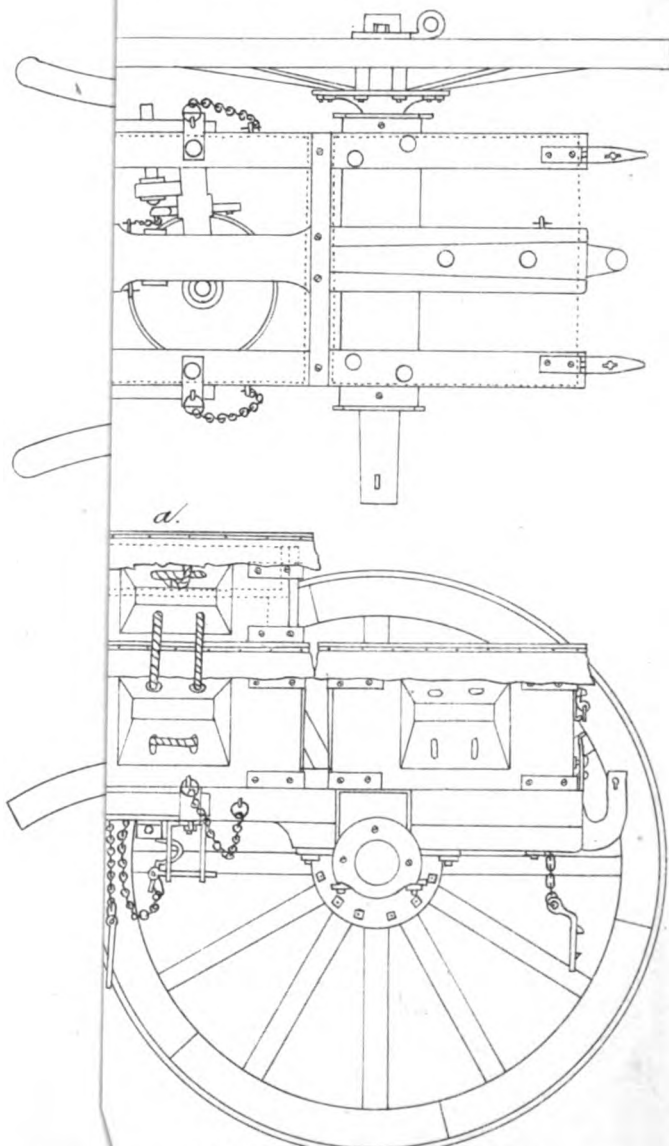
B. W. BLACK, Major,
Secy. Permt. Arty. Select Committee
of Artillery Officers.

Observations of the Acting Inspector General of Ordnance on Article 825.—The Acting Inspector General of Ordnance and Magazines is of opinion, that the reasons adduced by the Committee against the introduction of the crank axle for the Mountain Train Howitzer Carriage are sound and forcible,

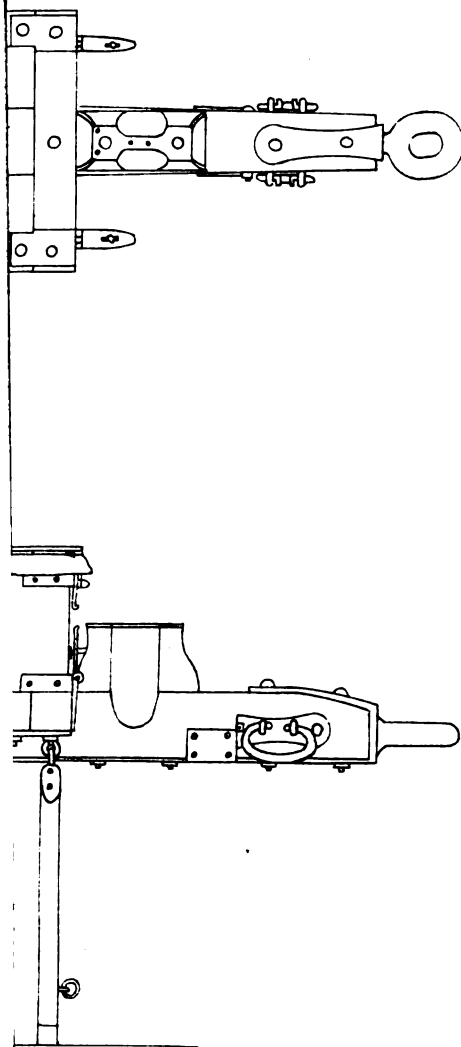
Ordnance,

Ordnance Bangalore.

nt^y Cameron.



Train,
Gun Carr ^{9^c} ^{7^d} Manuf^y



2 Feet.

and he concurs in opinion with the Committee that the present established straight axle should be preserved.

The Acting Inspector General concurs also with the Committee, in their recommendation that the present pattern Limber for the 12 Pounder Howitzer Mountain Train be superseded by that introduced by Captain Campbell; the latter possessing far greater stability, greater capacity, and being so constructed, that Howitzer and Limber, can turn in a much smaller circle than with the Established Limber; all great advantages, fully justifying the change of pattern.

Observations of the Brigadier Commandant of Artillery on Article 825.—I agree with the Committee that a straight axle is preferable to a crank one.

Orders of Government on Article 825.—The Governor in Council approves of the suggestions by the Committee, “that the Carriages of the present established pattern with “straight axle should be continued in use”—and the pattern Limber proposed by Captain Campbell be adopted.

The introduction of a Small Store or implement box for each Mountain Train piece is sanctioned.

The question of combining wood with iron for Mountain Train Carriages will be further reported on when occasion offers.

ARTICLE 826.

ON A WAGGON FOR USE WITH MOUNTAIN TRAIN ORDNANCE.

PLATE 131.

The Superintendent of the Gun Carriage Manufactory informs the Committee that the Inspector General of Ordnance has instructed him to make up, on a plan which he lays before them, a Waggon for use with the Mountain Train Ordnance now under preparation for service in China, on which the opinion of the Select Committee is requested—the object being to introduce a Carriage which may be used for

the conveyance either of Ammunition, or when the ammunition boxes are removed, of the Mortars belonging to the Mountain Train and their Beds.

OPINION.—The Committee observe from the plan before them that the body of the proposed Waggon is on the principle of Captain Campbell's Limber; that is, the framing is elongated to carry three Ammunition Boxes in place of two, and is fitted with a perch instead of a pole. The Waggon appears calculated to meet the object proposed, but the Committee consider the multiplication of wheel carriages with a Mountain Train Battery open to much objection.—Still as conveyance of this kind specially constructed for the particular service in question may be of use with the Force, Waggon of the pattern now proposed, if introduced, may more properly be sent with the Park,

Observations of the Acting Inspector General of Ordnance on Article 826.—The Acting Inspector General of Ordnance and Magazines is of opinion, that the proposed Waggon may with great advantage be added to the Mountain Train Equipment. He entirely concurs with the Committee in its remarks regarding Wheel Carriages generally, but there are occasions when the features of the country in which operations are carried on, and the character of the service, may render such Carriages of the highest advantage.

In the present instance the Acting Inspector General believes that a certain number of these Waggon attached to the reserve for China would be found greatly to facilitate the carriage of Ammunition and Stores for the Mountain Train pieces.

Observations of the Brigadier Commandant of Artillery on Article 826.—I concur in the opinion expressed by the Committee.

Orders of Government on Article 826.—Approved.

MEETING 210.

EXTRACT FROM THE PROCEEDINGS OF THE MADRAS PERMANENT SELECT COMMITTEE OF ARTILLERY OFFICERS, ASSEMBLED BY ORDER OF COLONEL E. AMSINCK, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot, St. Thomas' Mount 14th February 1860.

PRESENT.

LIEUT. COL. W. H. MILLER, *Commandant Artillery Recruit Depot.*

LIEUT. COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*

LIEUT. COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*

MAJOR C. J. COOKE, *Commanding 5th Battalion Artillery.*

MAJOR B. W. BLACK, *Director Artillery Depot.*

LIEUT. COL. J. L. BARROW, *Acting Principal Commissary of Ordnance.*

CAPTAIN E. H. COUCHMAN, *Assistant Adjutant General of Artillery.*

CAPTAIN J. Mc. K. MACINTYRE, *5th Battalion Artillery.*

ARTICLE 827.**ON A PATTERN PACK SADDLE AND PORTABLE FORGE.**

(a) No. 9832
9th February 1860-

The Acting Inspector General of Ordnance requests ^(a) that a pattern Pack Saddle and Portable Forge may be laid before the Select Committee for their decision as to its fitness for service in China.

OPINION.—The Committee after attentive consideration are of opinion that the English pattern of Pack Saddle and Portable Forge before them, constructed for use with pack animals in Europe, from structure as well as from excessive weight (being upwards of 20 stone) are quite unsuited for the Ponies of this Country—the liability to fracture of the frames, and difficulty of repairing them satisfactorily in the field, also render the adoption of this kind, of doubtful expediency.

2. The Committee therefore consider it would be preferable to adopt the ordinary method of pack carriage for ponies, with pads or Cogheers (of the description submitted with these Proceedings) which is extensively used for the conveyance of Merchandize in the Southern Mahratta country and Central India. Suleetahs or Kajawahs being used for con-

taining the loads according to the nature of the stores to be carried.

MINUTE BY MAJOR B. W. BLACK.

While concurring so far with the Committee in opinion that the Pack Saddle of the English Pattern is unsuitable for the general purpose of the carriage of stores on the animals of this Country, I do not agree with them that saddles modified in pattern, particularly as regards size, for the conveyance of the ammunition in Boxes for the Mountain Train, and of Rockets should not be introduced.

I think that a convenient number of Saddles and Boxes of the pattern proposed by the Select Committee of the Bombay Artillery Officers and already approved of by this Committee may with advantage be prepared, and sent to China specially for use with the Mountain Train, and also, that some saddles constructed of the same pattern as the saddles suggested by Foreman Hall at Moulmein which corresponds with Rocket Saddles Bengal pattern, should also be prepared. Both descriptions of saddles being provided with Cogheers by way of panelling, as recommended by the Committee for use with Sulleetahs or Kajawahs

Saint Thomas' Mount, } (Signed) B. W. BLACK, Major,
15th February 1860. } *Artillery.*

Observations of the Acting Inspector General of Ordnance on Article. 827—The pattern of Pack Saddle must be determined by the special purposes to which it is to be applied; and so far as the general requirements of a Force in the Field is concerned, I quite agree with the Committee, that the ordinary pack with Pads and Sulleetahs, is preferable to all others, but, on the other hand, I am of opinion that, for the carriage of the ammunition attached to a Mountain Train, or for the carriage of Rockets, the modified Bombay Pack Saddle is preferable.

With reference however to the special object of the present enquiry, that is, to determine the best description of

Pack Saddle for general service in China, I am convinced that the ordinary Pad Saddle is in every respect far preferable to any other, being more generally useful, lighter, occupying little space, and easily stowed on board ship, not subject to injury in transit, and cheaply and expeditiously made up.

Observations of the Brigadier Commandant of Artillery on Article 827.—The usual Camel Saddle used all over India, reduced in size for Ponies, is the most preferable, and adapted for any purpose.

Observations of the Commander-in-Chief, on Article 827, in a letter ^(a) from the Adjutant General of the Army Fort Saint George, to the Secretary to Government Military Department.—"His Excellency agrees in opinion with the Select Committee."

(a) No. 211
3rd March 1860.

Orders of Government on Article 827.—The Governor in Council concurs in the opinion expressed by the Committee, in para. 2 of the Extract from the Proceedings submitted with the foregoing letter.

ARTICLE 828.

ON THE SYSTEM OF EXAMINATION AND PROOF OF ORDNANCE CARRIAGES CONSTRUCTED AT THE GUN CARRIAGE MANUFACTORY.

(a.) No. 8780.
18th January 1860.

The Acting Inspector General of Ordnance requests^(a) the submission of this

* "By which it would appear that in Bengal, wooden Carriages and Platforms for 68-Pounders are not subjected to proof, but submitted to a Committee of Survey on their receipt from the Gun Carriage Agency. In Bombay, Garrison, and other Carriages, are examined by the Permanent Select Committee of Artillery Officers, and if found of the prescribed pattern, and of approved material and workmanship, are received into Store, without further examination or proof."

subject and the undermentioned documents* relating thereto, to

the Select Committee for consideration.

(b.) No. 474.
24th December 1859.

1. *Letter^(b) from the Commandant of Artillery to the Acting Inspector General of Ordnance.*—Referring to correspondence from Bombay

on the above subject, states, that he fully concurs in the view entertained by the Ordnance authorities at Bombay, and recommends "that the system of Proof be limited to " Carriages of a new construction; that is, to discontinue " the Proof of Carriages of Established patterns, but to " require as heretofore that all new constructions be sub- " jected to extraordinary Proofs under the direction of the " Permanent Artillery Select Committee.—Carriages of " Established pattern although they would not under this " arrangement be subjected to proofs by firing from them, " should all of them, as hitherto, undergo the same exa- " mination at the Arsenal as already established before they " are painted."

(c.) No. 9452,
Fort William,
17th December 1859.

2. *Letter^(c) from the Inspector General of Ordnance Bengal to the Inspector General of Ordnance Madras.*

(d.) No. 8363,
13th December 1859.

3. *Letter^(d) from the Inspector General of Ordnance Bombay to the Inspector General of Ordnance Madras, with Copy of a letter^(e) from the Bombay Permanent Artillery Select Committee to the Secretary*

Military Board Bombay.—States "that no special proof of " the Carriages manufactured in that Presidency has taken " place since the 22nd September 1840, when some Light " Field and one 8 inch Howitzer Carriages were subjected to " the severe shot proof of 250 rounds at different degrees of " elevation; these Carriages as well as some 12-Pounder " Howitzer and 6-Pounder Carriages tested in a similar " manner in 1839, and all those subjected on previous " occasions to the ordinary proof of 15 rounds, were found " to stand the trial well and without indicating any weakness " or fault in construction."

That the discontinuance of the mode of proving Carriages prior to November 1842 was sanctioned by Government

under date the 11th January 1843, as recommended by the

(c.) No. 51.
30th November 1859

Select Committee^(c), when they gave it as their opinion that the proof of every Carriage by firing 15 rounds with service charges at elevations varying from Point Blank to extreme was worth nothing. That all Light Field Carriages made up in that Presidency of the Established pattern, are examined in the same manner as Garrison Carriages and other similar material.

OPINION.—The Committee concur with the Select Committee of the Bombay Artillery Officers that the ordinary proof of Carriages of approved pattern with 15 rounds service charge at elevations varying from Point Blank to extreme is worth nothing.

2. They accordingly consider that while every Carriage of a new construction should in conformity with existing practice be subject to a severe proof, the proof of all newly made Carriages of the Established pattern may be dispensed with.

Observations of the Acting Inspector General of Ordnance on Article 828.—The Acting Inspector General of Ordnance and Magazines cannot concur in the opinion recorded on this question by the Committee—the simple fact that many new Carriages of established approved pattern do break down when subjected to the present slight ordinary Proof, is the strongest evidence of the necessity of proof before issue to the Regiment.

2. It is better that an untrustworthy Carriage should break down at Proof on the Practice ground, than on service in the Field.

3. It seems to the Acting Inspector General that the same reasoning which would omit the precautionary proof of Carriages, because they *ought* not to break down under it, would also omit the proof of Small Arms and Guns on the same grounds.

4. The recommendation to discontinue the Proof of 68-Pounder Carriages, is grounded on the fact that not one Carriage of that class has failed at Proof, and that the Proof of these Carriages *therefore*, entailing as it does, a heavy expenditure of Powder is unnecessary and inexpedient.

(*This subject reconsidered, vide Article 836.*)

ARTICLE 829.

ON THE BEST METHOD OF FIXING TIN COLLARS AND GRUMMETS TO SHOT AND SHELL—IN CONTINUATION OF ARTICLE 817,* MEETING 207, DATED 22ND DECEMBER 1859.

The undermentioned documents are laid before the Committee.

(a.) Meeting 207,
Article 817,
22nd December 1859,
Artillery Records
page 812.

1. *Original Extract^(a) from the Proceedings of the Select Committee.*—Extract.—“And further as it appears very
“desirable to ascertain how far the plan of fixing bottoms
“by a metal rivet, adverted to in the papers received from
“Woolwich, has been found to answer, that a letter be
“addressed to the Officer Commanding the Royal Artillery
“for information on this point.”

(b.) No. 5885,
20th January 1860,
Artillery Records
page 813.

2. *Observations^(b) of the Acting Inspector General of Ordnance on Article 817 of Meeting 207.*—“The Acting Inspector
“General of Ordnance and Magazines is of opinion that
“the Royal Artillery method of fixing bottoms to shot
“should be adopted in the Madras Artillery.”

(c.) No. 126,
26th January 1860.

3. *Letter^(c) from the Officer Commanding Royal Artillery Madras Presidency.*—Forwarding Reports from the Officers Commanding Batteries of the Royal Artillery on the efficiency of wooden bottoms

* Artillery Records page 812.

fixed to Shot and Shell with metal rivets, from which it appears that the present method is satisfactory; and that as informed by Lieutenant and Adjutant Broughton Royal Artillery, Shells fixed with bottoms in the manner described, were subjected to severe tests at home, by being carried in Waggons at a trot for 500 miles and that they stood the trial perfectly.

OPINION.—The Committee after perusal of the above documents, recommend that a Lathe of the description required to prepare bottoms for all Calibres should be provided as soon as possible, and a fair trial given to the plan.

Observations of the Acting Inspector of Ordnance on Article 829.—The Acting Inspector General refers to his remarks on this subject No. 8885, of 20th January 1860, viz. that he is “of opinion that the Royal Artillery method of fixing bottoms to shot should be adopted in the Madras Artillery.”

Observations by the Brigadier Commandant of Artillery on Article 829.—I consider that the Royal Artillery pattern should be adopted.

Observations of the Commander-in-Chief on Article 829, in letter from the Adjutant General of the Army^(d) Fort Saint George, to the Secretary to Government Military Department.—His Excellency agrees with the Brigadier Commandant of Artillery, and the Inspector General of Ordnance, that the Royal Artillery pattern should be adopted.

(d.) No. 246
12th March 1860.

Orders of Government on Article 829.—Sanctioned—the result of trial being reported in due course.

ARTICLE 830.

ON THE BREAKING DOWN OF CERTAIN SICK CARTS RECENTLY IN USE WITH THE 7TH REGIMENT N, I.—IN CONTINUATION OF ARTICLE 818 OF MEETING 207 DATED 22ND DECEMBER 1859.

The undermentioned documents are laid before the Committee.

(a.) Meeting 207
Article 818
22nd December 1859
Artillery Records
Page 813.

1.—*Original Extract^(a) from the Proceedings of the Select Committee.*

(b.) No. 8891
20th January 1860.
Artillery Records
Page 814.

Observations^(b) of the Inspector General of Ordnance on Article 818 of Meeting 207.

OPINION.—In reference to the observations by the Acting Inspector General of Ordnance on Article 818, at Meeting 207, the Committee believe that if Sick Carts are fairly used, the established pattern is of sufficient scantling for the work required of them, but as there is reason for apprehending that these carts are frequently overloaded, an increase in the scantling may be necessary to meet these contingencies; the Committee however would observe that if the scantling be increased, to be any benefit, it should be to an extent which it is feared will result in the difficulty already adverted to by the Committee, in their original opinion, vizt. that the carts would then be too cumbrous for use.

Artillery Records
Page 814.

Observations of the Inspector General of Ordnance on Article 830.—The Acting Inspector General of Ordnance and Magazines begs to refer to his observations on this subject No. 8891 of 20th January 1860, which accompany the Proceedings.

Observations of the Commander in Chief on Article 830—Vide Artillery Records pages 814 and 815.

Orders of Government on Article 830.—vide Artillery Records page 815, viz. The Governor in Council concurs in the opinion of the Commander-in-Chief and Committee.

MEETING 211.

EXTRACT FROM THE PROCEEDINGS OF THE MADRAS PERMANENT SELECT COMMITTEE OF ARTILLERY OFFICERS, ASSEMBLED BY ORDER OF COLONEL E. AMSINCK, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot, St. Thomas' Mount 30th March 1860.

PRESENT.

LIEUT.-COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*
 LIEUT.-COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 LIEUT.-COL. C. J. COOKE, *Commanding 5th Battalion Artillery.*
 MAJOR. B. W. BLACK, *Director Artillery Depot.*
 LIEUT. COL. J. L. BARROW, *Acting Principal Commissary of Ordnance.*
 CAPTAIN E. H. COUCHMAN, *Assistant Adjutant General of Artillery.*
 CAPTAIN S. R. SMITH, *3rd Battalion Artillery.*
 CAPTAIN C. L. YEOMAN, *4th Battalion Artillery.*

ARTICLE 831.

ON THE CHARACTER OF THE TIMBER TESTS CARRIED ON AT THE GUN CARRIAGE MANUFACTORY.

(a.) No. 1748,
15th June 1859. The Inspector General of Ordnance and
 Magazines forwards^(a) for submission to
 the Select Committee, the undermentioned correspondence
 on the above subject.

(b.) No. 376,
16th May 1859. 1. *Letter^(b) from the Superintendent of
 the Gun Carriage Manufactory to the In-
 spector General of Ordnance.*—Forwards additional informa-
 tion in reference to the failure of the 9-Pounder Carriages
 in use with the Nagpore Irregular Force,*
 and states that he is at a loss to account
 for the failure of these Carriages, otherwise
 than by attributing them to the effects of the weather which
 might have deteriorated the wood work, or the Iron works
 not having been properly drawn up and tightened, the Car-
 riages could not stand the shock of firing.

* Vide Meeting 199
 Article 791, page 715 to
 717 Artillery Records.

Carriages.	Timber whence received.	At what time obtained.	How long seasoning in Log at the Manu- factory.	How long seasoning in Half Wrought.	Remarks.
No. 1. Carriage Gun 9 Pounder Experimental, solid Beam constructed of <i>Trichinopoly Teak</i> , in May 1852 by order of the Military Board No. 2389 dated 20th April 1852.	Trichinopoly sent from Annamulley for the Trichinopoly Barracks.	May 1850.	0 2 Years. Months.	1 6 Years. Months.	(Breakage Report of this Timber forwarded to the Military Board 26th November 1850. Timber broke with 12, 14, 16, and 18 weights or average 1864 lbs.
No. 2. Carriage Gun 9 Pounder Experimental, solid Beam constructed of <i>Trichinopoly Teak</i> , in Aug. 1852 by order of the Military Board No. 3918 dated 30th June 1852.	Trichinopoly sent from Annamulley for the Trichinopoly Barracks.	May 1850.	0 2 Years. Months.	1 10 Years. Months.	(Breakage Report of this Timber forwarded to the Military Board 26th November 1850. Timber broke with 12, 14, 16, and 18 weights or average 1864 lbs.
No. 3. Carriage Gun 9 Pdr. A. S. C. P., solid Beam constructed of <i>Ped-dowk Wood</i> , in October 1852 by order of the Military Board No. 2000 dated 30th March 1852.	Received from the Commissariat Department.	February 1849.	0 11 Years. Months.	2 9 Years. Months.	(Breakage Report of this Timber forwarded to the Military Board 4th April 1849. Timber broke with 12, 16, 18, 20, and 22 weights—or average 1013 lbs.
No. 5. Beam in 2 pieces constructed of <i>Trichinopoly Teak</i> in Oct. 1852 by order of the Military Board No. 2000 dated 30th March 1852.	Trichinopoly sent from Annamulley for the Trichinopoly Barracks.	May 1850.	Left 0 1 Right 0 1 1/2 Years. Months.	2 2 Left 2 1 Right 2 1 Years. Months.	(Breakage Report of this Timber forwarded to the Military Board 26th November 1850. Timber broke with 12, 14, 16 and 18 weights—or average 1864 lbs.
No. 6. Carriage Gun 9 Pdr. A. S. C. P., Beam in 2 pieces constructed in October 1852 of <i>Coimbatore</i> and <i>Trichinopoly Teak</i> , by order of the Military Board No. 2000 dated 30th March 1852.	Trichinopoly sent from Annamulley for the Trichinopoly Barracks.	Coimbatore Teak Oct. 1847	Right 2 9 Left 0 1 Years. Months.	2 3 Right 2 1 Left 2 1 Years. Months.	(Breakage Report of Coimbatore Teak forwarded to the Military Board 13th December 1847. Timber broke with 12, 14, and 16 weights—or average 789 lbs.
		Trichinopoly Teak May 1850.	Left 0 1 Right 0 1 Years. Months.	2 1 Left 2 1 Right 2 1 Years. Months.	(Breakage Report of Trichinopoly Teak forwarded to the Military Board 26th November 1850—Timber broke with 12, 14, 16, and 18 weights—or average 864 lbs.

Gun Carriage Manufactory. }
Madras 16th May 1850.

N. B. The Teak Timber received from Trichinopoly had been seasoning in Log for some years at that station previous to its being received at the Gun Carriage Manufactory.

J. MAITLAND, Lieut. Colonel,
Superintendent Gun Carriage Manufactory.

(c.) No. 681,
17th May 1859.

2. *Letter^(c) from the Inspector General of Ordnance to the Principal Commissary of Ordnance.*—Forwards in original the above letter from the Superintendent Gun Carriage Manufactory to be returned with his observations, and requests that he will at his next visit to the Manufactory, look into the records, and see how the existing tests of wood establish the efficiency of the Timber with which particular carriages are made.

(d.) No. 1942,
6th June 1859.

3. *Letter^(d) from the Principal Commissary of Ordnance to the Inspector General of Ordnance,* of which the following is an Extract—

1st. "That in my Letter No. 3883 dated 6th September

"7. The experiment referred to in 1858 Para. 7, I have specially
Para. 6 of Major Maitland's report possesses no practical value whatever. To test only 3 Logs of Wood taken from a supply of hundreds of Logs with the view of determining the quality of the whole quantity, when we know that each individual Log differs from others in character and value, is a mere form calculated only to lead to the most erroneous conclusions."

I noticed the most unsatisfactory character of the so called Timber Tests carried out at the Gun Carriage Manufactory, and I now distinctly report, that the breakage reports, as entered in the Manufactory Records, give no information whatever touching the quality of the Timber of which any particular Carriage may have been constructed.—Nor is it in the power of the Superintendent, from his Records, to state what the breaking weight of the Timber worked up into Carriages may have been.

2nd. All that the practice obtaining at the Gun Carriage Manufactory does shew is, that the one or two Logs taken from a large batch of Timber, on testing, gave certain breaking results, but the Record does not pretend to shew the character of the other Logs of the same batch untested; nor does it shew the particular Carriages made up from the tested Logs.

3rd. The Records of the breakage Reports at the Manufactory convey therefore no clue, or guide, whatever, on the

breaking down of Carriages, as to the character and quality of Timber of which those Carriages were made up.

4th. In my opinion it is of the first importance that a system of tests at the Manufactory should be so carried out, as to shew the breaking weights of each Log of Timber from which Carriage Beams have been constructed."

OPINION.—The Committee before coming to an opinion on this subject, consider it desirable to ascertain to what extent breakage tests of timber are carried on in the Gun Carriage Manufactories of Bengal and Bombay, with the view to the identification, when necessary, of the timber used in the construction of any particular carriage, with the logs from which the different parts of the wood work of the Carriage may have been cut.

2. As it is important to know the nature of the Timber tests established in the other two Presidencies, and the extent to which they are conducted, not only in regard to the particular object now referred to, but with reference to their general utility and application, the Secretary will address the Superintendents of the Gun Carriage Manufactories in Bengal and Bombay, with the view to the Committee being provided with detailed information on this important subject.

ARTICLE 832.

ON THE SUBJECT OF BUCKET HOOKS, ELEVATING SCREWS,
AND WRENCHES OF THE ESTABLISHED PATTERN CARRIAGES—

(a.) No. 11,018
16th March 1860.

The Acting Inspector General of Ordnance forwards^(a) for submission to the Se-

lect Committee the undermentioned correspondence on this subject.

(b.) No. 103
26th February 1860.

1.—*Letter^(b) from Captain R. Morton, Acting Deputy Commissary of Ordnance Bellary to the Inspector General of Ordnance.*—Reports upon the following points connected with the Established pattern of Light Field Carriages.

1st. Bucket Hooks.—Are frequently giving way, the defects appear to be that the screw of the hook, when the carriage is limbered up, is at an angle of more than 50 degrees, and there is in consequence very little more than the thread of the screw to support the weight of the bucket, and also that it is placed in the centre, in the join of the two pieces forming the beam, this join opens more or less from the effect of climate and the hold of the screw is weakened and it necessarily falls out as soon as it has to support any weight, no plugging up will render it perfectly secure; One of the carriages now in use with the Artillery has been repaired with a plate made to the hook, the hook being in the same position as before, but fastened by the plate being screwed on to the upper surface of the beam—this plan is being tried as an experiment.

2nd. Elevating Screws.—Reports that the Elevating Screw of one of the 9-pounder Gun Carriages in use with the Artillery at Bellary came into the Arsenal for repair “bent,” so that it could not be lowered beyond the seventh thread; the screw was straightened and issued and after a day or two’s use was again found to be bent as before.—Is of opinion that the cause of bending may be attributed to the metal of the screw being bad and weak or that the Gun being *short* the weight does not rest fairly over the screw itself—it may be the result of both these circumstances combined—but the position of the gun alone may be sufficient to account for it—for whenever the breech of the gun is jerked off the capstan head of the screw either in firing or jolting over uneven ground, it returns like a lever hammer working from the trunnions, and unless the point of contact with the base ring of the Gun is immediately over the vertical line of the screw itself, it will fall either short of or beyond it, and a part of the force of every blow thus caused, will, when resolved by contact with the capstan head of the screw, be applied to drive the screw from its vertical position, or in other words to bend it.—Brings to notice that on examining

the Elevating Screws of all the Light Field Carriages (9-pdr.) to see if they would fit any of the carriages, found that they did not, and that of the five Elevating Screws tried, *one* could be used for three carriages only including its own,—*one* for two carriages only, and *three* for their own particular carriages only.

3rd. Wrenches.—Suggests that a pattern wrench should be adopted for the new pattern Light Field Carriages, and made according to the sizes of the nuts of all description used in the construction of these Carriages, as the Officer Commanding the Artillery at Bellary discovered that the old wrenches in use with his Battery were very few of them of any use, and that many of the nuts could not be turned by them.

(c.) No 188,
6th March 1860.

2.—Letter^(c) from the Superintendent of the Gun Carriage Manufactory to the Inspector General of Ordnance.—Observes 1st., with regard to the Bucket hooks, that he has no doubt the case may be with them as represented by the Deputy Commissary and his mode of fixing them may also be an improvement.—That the present mode of fixing them is the same that has been pursued since Block Trail Carriages have come into use and that is since 1847.—That the usual method of repairing them is by substituting another a little thicker in the screwed part and, thread made coarser.—In the Royal Artillery the Bucket hooks appear to be fixed merely by being driven in with jagged ends.

2nd. With reference to the Elevating Screws bending—this arises from being only $1\frac{1}{2}$ inches diameter and the Base ring of the gun bumping on them. But as it is ruled in future constructions that Light Field Carriages are to have Elevating Screws $1\frac{3}{4}$ inches diameter, and to be fixed to the Cascable of the gun like the Royal Artillery, the defects complained of will not again occur.—Entirely disagrees with Captain Morton who attributes the bending to the metal of screw being bad.—On the contrary bending is an indication

of good metal.—With regard to the Elevating Screws not fitting all round, this is attributable to their being bent, and not from any dissimilarity in their make or size, as all the screws are cut to the same pitch and regularly gauged, and each box also after being cut in the lathe, has a standard finishing screw tap passed through it, so that every thing is done to render them as correct as possible.

3rd. The Wrenches of which there is one to every Carriage are all made similar, and the two ends are made to embrace the largest and smallest sized nuts in the Carriage, the intermediate sizes are made to fit either end by packing them.—Is of opinion it would be very inconvenient to have a wrench to every size nut.

OPINION.—The Committee recognize the necessity of revising the method of fixing the Bucket hooks in the Beams of the Light Field Carriages, and accordingly they now recommend the adoption of Hooks of the pattern in use with the Royal Artillery.

2. As it is necessary the perforation for the shank of the hook should be quite clear of the joint between the two half beams, the position for it should be $3\frac{1}{2}$ inches from the inside of the right cheek; it should also be fixed as high as is consistent with convenience so as to lessen as far as possible the swing of the bucket.

3. The question affecting the Elevating Screws, referred to in this correspondence, has already been disposed of in Article 812, Meeting 206, of 26th October 1859.

4. As regards Wrenches;—as 6 wrenches and 6 hammers-wrench, form portions of the allotment with every Light Field Battery, the Committee considers that the requirements of the service in these particulars have already been provided for.

Observations of the Acting Inspector General of Ordnance on Articles 832, 833, 834 and 835.—The Acting Inspector General concurs in the opinions recorded by the Select Committee respectively on the above mentioned Articles.

Observations of the Brigadier Commandant of Artillery on Article 832.—The pattern adopted by the Royal Artillery should be brought into use with Madras Ordnance Carriages, as proposed by the Committee.

Observations of the Commander-in-Chief on Articles 832, 834 and 835, in letter^(d) from the Adjutant General of the Army Fort St. George, to the Secretary to Government Military Department.—The Commander-in-Chief concurs in opinion with respect to the Transport Carriage for Heavy Ordnance. His Excellency also agrees with the Commandant of Artillery as regards substituting Zinc for Copper in Ammunition Boxes, and in reference to adopting the Royal Artillery Pattern for Bucket Hook.

Orders of Government on Article 832.—The assimilation of Bucket hooks with the pattern in use with Royal Artillery, is approved.

ARTICLE 833.

ON A DRAG SHOE FOR HEAVY FIELD CARRIAGES, PROPOSED BY LIEUTENANT COLONEL J. MAITLAND. PLATE 132.

The Acting Inspector General of Ordnance forwards^[a] for submission to the Select Committee a Drawing of a Shoe for Heavy Field Carriages proposed by Lieutenant Colonel J. Maitland, Superintendent of the Gun Carriage Manufactory.

OPINION.—The Committee observe that the Drag Shoe now proposed is of the same pattern as that recently established for Light Field Carriages, but of suitably enlarged dimensions.—As this pattern thus modified in regard to dimensions, seems to be equally well adapted for the Heavy Field Carriages, the Committee recommend its adoption.

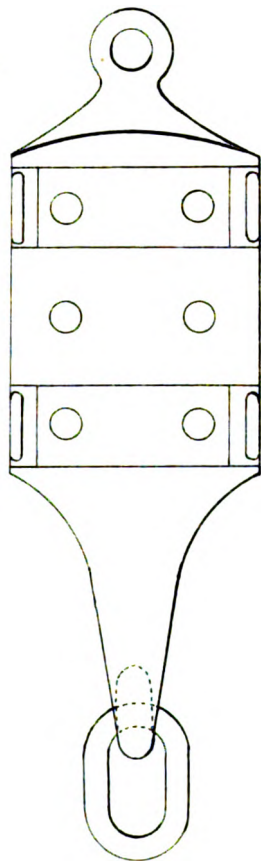
Observations of the Brigadier Commandant of Artillery on Article 833.—I concur in the opinion given by the Committee,

[a] 11,020
15th March 1860.

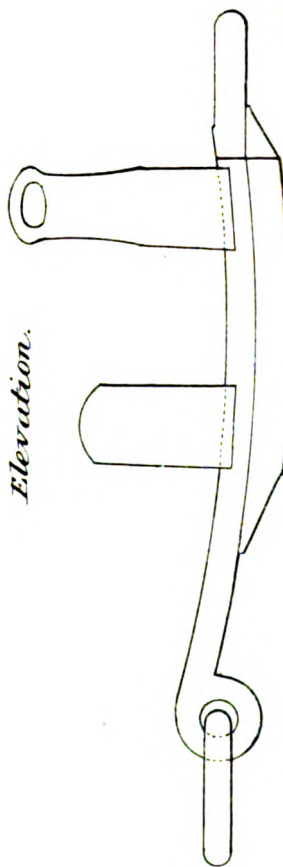
Drag Shoe for Heavy Field Carriages, -

proposed by Lt Col^l J. Maitland Sup^t G. Carr. Manuf^y.

Plan



Elevation.



ARTICLE 834.

ON A PROPOSITION BY LIEUTENANT J. CURRAN, TO SUBSTITUTE ZINC FOR COPPER BOXES OF AMMUNITION BOXES.

[a] No. 10,590
1st March 1860.

[b] dated
27th February 1860.

The Acting Inspector General of Ordnance forwards^[a] Copy of a letter^[b] from Lieutenant J. Curran Deputy Assistant Commissary of Ordnance, relative to the above suggestion, and requests it may be laid before the Select Committee.

OPINION.—As Zinc is already in use for storing Friction Tubes, there appear to be no objections to its use being extended for like purposes.—Accordingly the Committee recommend the adoption of the present suggestion of substituting Zinc for Copper in the construction of the boxes for Cartridges in the Ammunition Boxes of Waggon and Limbers.

2.—The Committee however consider it desirable that reports on the efficiency or otherwise of Zinc for Boxes for Ammunition should be made after sufficient time shall have elapsed for the test before the material be finally adopted for the purpose proposed.

Observations of the Brigadier Commandant of Artillery on Article 834.—Zinc is not always to be procured, and when damaged might not be easily repaired.—Copper can be had all over India, and should not be given up without a good reason beyond cheapness.

Orders of Government on Article 834.—The Governor in Council concurs in the remarks by the Committee in para. 2 of their opinion.

ARTICLE 835.

ON THE FAILURE OF A TRANSPORT CARRIAGE.

(a.) No. 12, 825
27th April 1859

(b.) Dated Camp
Nundegamah
19th April 1859.

The Inspector General of Ordnance and Magazines forwards^(a) a Report^(b) from the Warrant Officer proceeding in charge of a lately constructed Transport Carriage, em-

ployed for conveying a 95 cwt. 68-Pounder Gun from Masulipatam, and directs that the subject may be laid before the Select Committee for consideration.

The undermentioned documents are laid before the Committee.

- (c.) No 164
3rd May 1859. 1.—*Letter^(c) from the Brigadier Commandant of Artillery to the Inspector General of Ordnance.*—Recommends before submitting the above documents to the Permanent Artillery Select Committee, that special Committees be assembled at Nagpore and Secunderabad to report on these Carriages on their arrival at those Stations; the Proceedings of which, with all obtainable information will enable the Artillery Select Committee to give the subject their fullest consideration.

- [d.] No. 274
9th May 1859. 2.—*Letter^[d] from the Inspector General of Ordnance to the Brigadier Commandant of Artillery.*—States that as suggested, he will address the Officer commanding Nagpore Force and Hyderabad Subsidiary Force for assembling special Committees to inquire into the failure of the Transport Carriage, and forward the Proceedings when received.

- [e.] No. 423
12th May 1859. 3.—*Letter^[e] from the Inspector General of Ordnance to the Brigadier Commandant of Artillery.*—Forwards three sketches* received from the Commissary of Ordnance Secunderabad, shewing the fracture of the Transport Carriage.—The Report states that the “right cheek of the Carriage broke asunder close to the Bolt, the fracture running obliquely down to where the cheek is housed on to the Axle-tree case.”

States that he has addressed the Officer commanding Hyderabad Subsidiary Force in reference to this Carriage, and requested him to assemble a Committee to enquire into the

Artillery Select Committee.

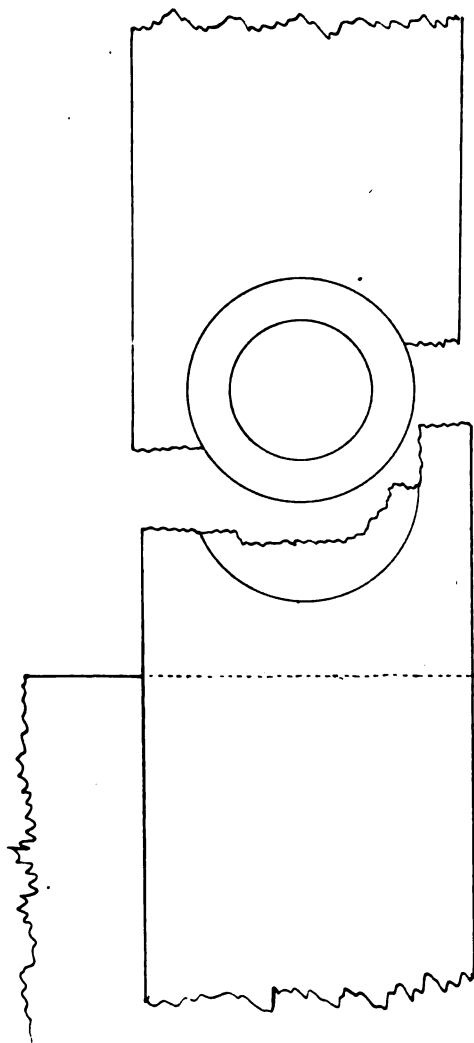
Page 854

Meeting 211, Article 835.

Plate 133.

*Sketch of a Fracture of a Transport Carriage
in rear of the Axletree Bed.*

Plan

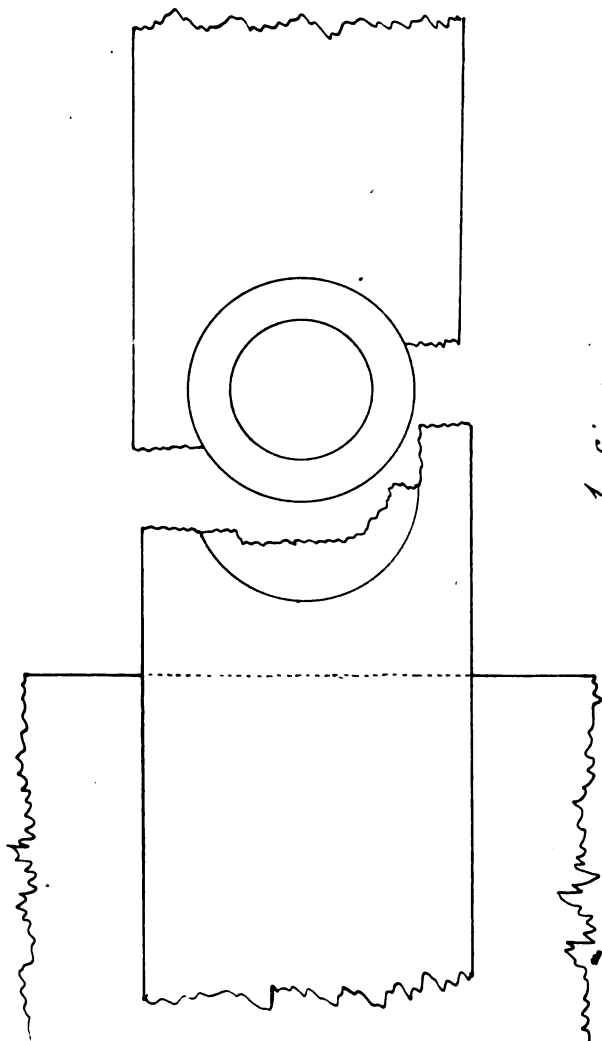


$\frac{1}{3}$ Sixe.

*Arsenal Secunderabad.
5th May 1859.*

*Sketch of a Fracture of a Transport Carriage
in rear of the Axletree Bed.*

Plan

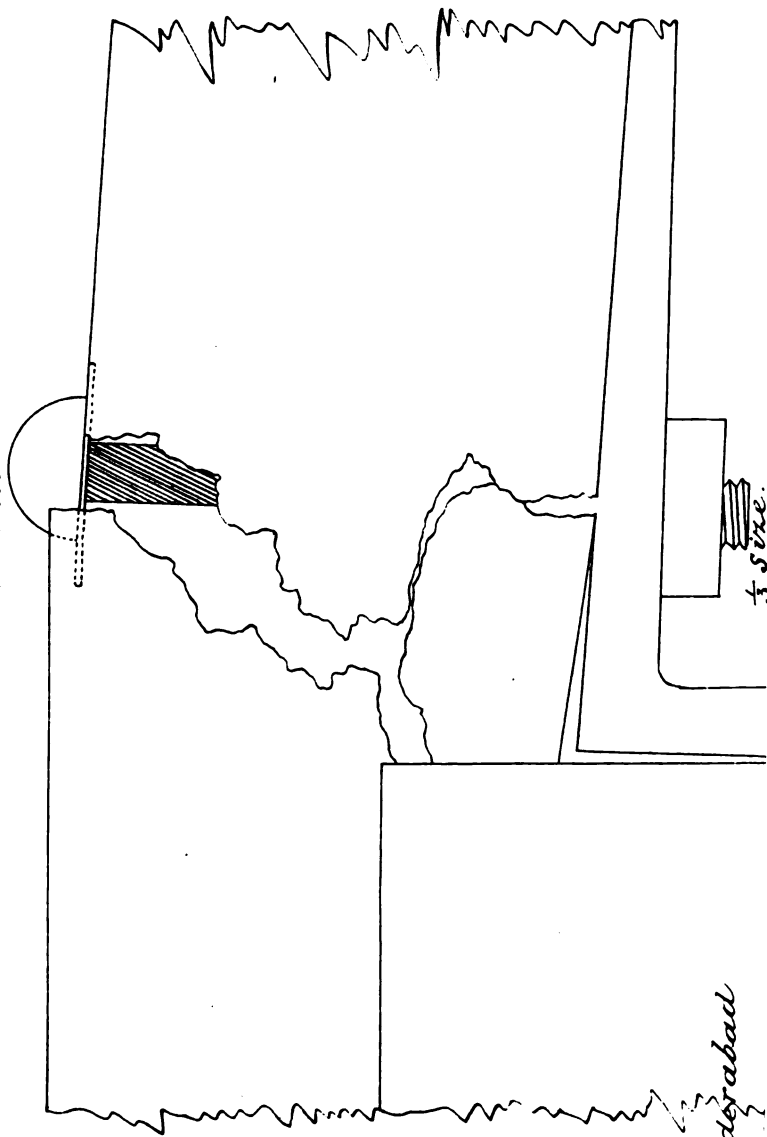


$\frac{1}{3}$ Size.

Arsenal Secunderabad.
5th Nov 1859.

Sketch of a Fracture of a Transport Carriage,
in rear of the Salletree Bed.

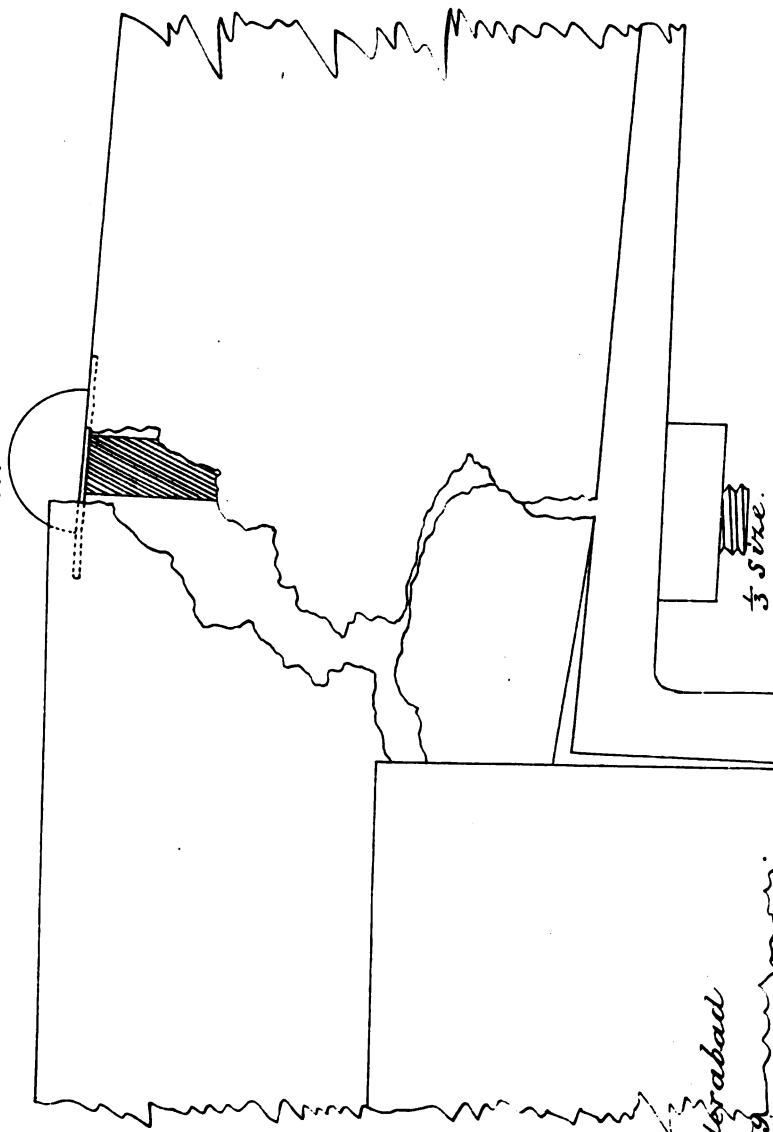
Inner View.



Arsenal Secunderabad

Sketch of a Fracture of a Transport Carriage,
in rear of the Axletree Bed.

Inner View.



Arsenal Secunderabad

5th May 1859

cause of the fracture, and that the Proceedings will be sent when received.

Recommends the Committee to have before them as soon as possible, the new Transport Carriages now ready at the Gun Carriage Manufactory.

(f.) No. 790
19th May 1859.

4.—*Letter^[f] from the Inspector General of Ordnance to the Secretary Artillery Select Committee (through Brigadier Commandant of Artillery).*—States that he has forwarded to the Brigadier Commandant of Artillery, the Register of three Transport Carriages for 68-Pounders constructed at the Gun Carriage Manufactory; and considering the importance of the enquiry respecting the failure of the Transport Carriage referred to in the above communication^[a], requests that the subject be brought before the Select Committee, and that he be favored with their report at an early date.

[g.] No. 1134
28th May 1859.

5.—*Letter^[g] from the Inspector General of Ordnance to the Secretary Artillery Select Committee (through Brigadier Commandant of Artillery).*—States that the Principal Commissary of Ordnance has just communicated a report of the failure of one of the two Transport Carriages conveying 68-Pounder Guns to Nagpore, and requests the circumstance may be brought to the notice of the Artillery Select Committee.

"I also beg to state that the crack of
"another Transport Carriage cracked in
"the same place as the former one which
"I reported on a former occasion."

Annexes in the margin Extract from a report received from the Warrant Officer proceeding in charge of the Guns.

[h.] No. 1578
11th June 1859.

6.—*Letter^[h] from the Inspector General of Ordnance to the Secretary Artillery Select Committee (through Brigadier Commandant of Artillery).*—Forwards Proceedings of a Committee of Survey assembled at Secunderabad, for submission to the Artillery Select Committee.


Proceedings of a Committee of Survey assembled by order of Brigadier E. Aphorpe, C. B., Commanding Hyderabad Subsidiary Force, at the Arsenal Secunderabad to report upon the causes of failure of a Transport Carriage lately arrived from Masulipatam.

COLONEL R. C. MOORE, Madras Artillery, *President.*

CAPTAIN C. WRIGHT, Royal Artillery,

H. T. MOLESWORTH Madras Horse Artillery. } *Members.*

The Committee having assembled agreeably to Cantonment orders of 28th May 1859 proceed to examine the Transport Carriage.

Description	Number.	Marks.			State.			Remarks.
		Initial letter.	Year.	No.	S.	R.	U.	
Carriage wooden Transport with Limber and Boxes.	1		1858.	4	0	1	0	<p>By inspection of the left cheek of the Carriage the cause of the failure of the right cheek may be attributed to there not being sufficient depth of wood over the axletree case where the cheek diminishes from 8 inches to 6½ to the close juxta position of two bolts (one of 1½ inches in diameter passing vertically through the cheek to the continuation of the axletree band, the other ¾ of an inch in diameter penetrating horizontally the cheek and one end of which forms a lashing hook) immediately in rear of the axletree case. The lashing hook instead of forming the termination of a bolt should be fixed into a band passing over and round the cheek.</p> <p>The wood of the fractured cheek appears to be perished from exposure to the action of fire, and the shavings crumble to dust when rubbed between the fingers. The Committee recommend that the depth of the cheeks be increased to 10 inches and the breadth to 5½ inches and that the axle-tree band be continued to the rear of the rear upper-cross bar.</p>

SECUNDERABAD, }
30th May 1859. }

(Signed) R. C. MOORE, Colonel, *President.*

" CHAS. WRIGHT, Captain, } *Members.*

" H. T. MOLESWORTH, " }

(A true copy,)

(Signed) E. T. FASKEN, Captain,

Assistant to the Inspector General of Ordnance and Magazines.

[i] No. 33 37
8th August 1859.

7. *Letter [i] from the Acting Inspector General of Ordnance to the Secretary Artillery Select Committee (through Brigadier Commandant of Artillery)*—Subjoins Extract from a letter from the Commissary of Ordnance Nagpore, and broken portion of the Transport Carriage, referred to in the report of the

* Extract given in letter (e) No. 428 12th May 1859.

Commissary of Ordnance, Secunderabad*
“ The fracture in one of the Transport Carriages being on the Cheek just over the Axletree bed, leads me to believe it is caused by the Cross Bar being placed too far out, which causes a greater weight than the cheek could bear up when the gun is slung under ; if it were somewhat shorter it might answer better, as the Cheek is also too much cut away, to receive the Axletree Bed, which helps to weaken this part ;— a few fractures have been found on the spokes of these wheels, which will occur by coming in contact with large stones which cannot be avoided, especially over such rough soil as between Secunderabad and Nagpore via ‘ Nirmul’ . ”

OPINION.—The Committee do not attribute failure in the Cheeks of these Transport Carriages to the quality of the Teak used in their construction ; for taking into consideration the excessive strain resulting from the suspension from them of so ponderous a mass as a 68 Pounder there appears adequate reason for the fractures in the insufficiency of scantling in the cheeks, combined with the proximity of two bolts, one passing vertically, the other horizontally through each cheek immediately behind the housing of the cheek upon the axle-case.

2. The Committee recommend that either Saul or Ped-dowk Beams be used for cheeks in place of Teak, and that the horizontal bolt, which is the shank of the hook for the Trace chain be removed, and that the Axle-tree band be increased in dimensions and fitted with a hook for the Trace chain, so as to remove the point for traction from the cheeks in rear of the axle to the front of the axle case ; which ar-

rangement, if adopted, would conform to the plan for fixing the Trace hooks of other Carriages of the Heavy Field Train.

• Plate 136.

3. A Sketch* of the axletree band and hook proposed to replace the bolt and hook accompanies.

Observations of the Brigadier Commandant of Artillery on Article 835. I concur in the opinion given by the Committee.

Orders of Government on Article 835.—Approved.

SPECIAL MEETING

EXTRACT FROM THE PROCEEDINGS OF THE MADRAS PERMANENT SELECT COMMITTEE OF ARTILLERY OFFICERS, ASSEMBLED BY ORDER OF COLONEL E. AMSINCK, BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot St. Thomas' Mount 20th April 1860.

PRESENT.

LIEUT.-COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*
 LIEUT.-COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 LIEUT.-COL. C. J. COOKE, *Commanding 5th Battalion Artillery.*
 MAJOR. B. W. BLACK, *Director Artillery Depot.*
 MAJOR. W. K. WORSTER, *Barrack Master Fort Saint George.*
 LIEUT. COL. J. L. BARROW, *Acting Principal Commissary of Ordnance.*
 CAPTAIN W. C. F. GOSLING, *Commanding Artillery Recruit Depot.*
 CAPTAIN A. STEWART, *Assistant to Inspector General of Ordnance.*
 CAPTAIN E. H. COUCHMAN, *Assistant Adjutant General of Artillery.*
 CAPTAIN S. R. SMITH, *Commanding B. Company 3rd Battalion Artillery.*

ON FOUR EXPERIMENTAL CARRIAGES OF MAJOR CAMPBELL'S PATTERN.

The Inspector General of Ordnance and Magazines forwards

[a] No. 4612
 30th August 1859
 and
 No. 11869
 17th April 1860.

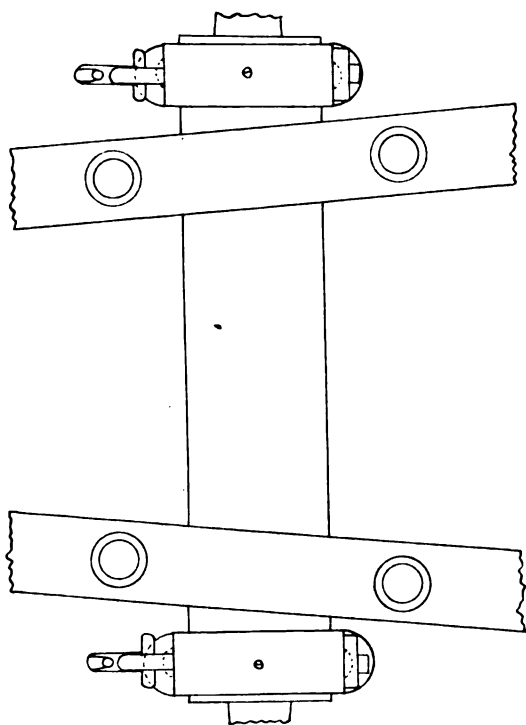
letters [a] requesting that Carriages constructed by Major Campbell with wood and iron may be submitted for the consideration of the Permanent Select Committee of Artillery Officers.

Artillery Select Committee.

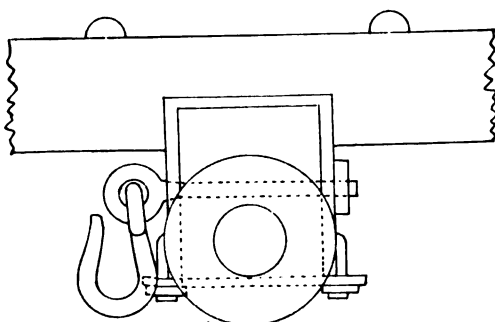
Page 858. Meeting 211, Article 835. Plate 136.

*Sketch shewing alterations in Axletree-bar
and Trace Hook of Transport Carriages*

Plan.



Elevation.



The undermentioned documents are laid before the Committee.

- | | |
|---|---|
| (b.) Dated
13th June 1859 | 1. <i>Proof Report^(b) of an 8 Inch Howitzer Carriage at Bangalore.</i> |
| (c.) No. 464
11th May 1859. | 2. <i>Letter^(c) from Capt. T. H. Campbell to the Inspector General of Ordnance and Magazines.</i> |
| (d.) No. 19
7th January 1859. | 3. <i>Letter^(d) from the Commissary of Ordnance Bangalore to—Do.</i> |
| (e.) 10th October 1858
16th December " | 4. <i>Proof Reports^(e) of a 24 Pdr. Howr. Carriage at Bangalore.</i> |
| (f.) No. 126
11th February 1859 | 5. <i>Letter^(f) from the Superintendent Gun Carriage Manufactory to the Inspector General of Ordnance.</i> |
| [g.] No 776
14th July 1859 | 6. <i>Letter^(g) from the Commissary of Ordnance Bangalore to—Do.</i> |
| [h] No. 858
13th August 1859 | 7. <i>Letter^[h] from do. to do.</i> |
| [i] Dated
11th July 1859 | 8. <i>Letter^[i] from the Officer Commanding C. Company 2nd Battalion Artillery to Captain T. H. Campbell.</i> |
| [j] No. 787 | 9. <i>Letter^[j] from Capt. T. H. Campbell to the Officer Commanding Arty. Mysore Division Bangalore.</i> |
| [k.] Dated
22nd July 1859 | 10. <i>Letter^[k] from the Officer Commanding C. Troop Horse Artillery to the Staff Officer of Artillery Bangalore.</i> |
| [l] Dated
16th July 1859. | 11. <i>Proof Report^[l] of a 6 Pounder Carriage at Bangalore.</i> |
| [m] Dated
13th August 1859 | 12. <i>Table^[m] of comparative weights of Established pattern and Major Campbell's 6 Pounder Carriages.</i> |

[n] No. 260
2nd April 1860

13 *Letter^[n] from the Superintendent of the Gun Carriage Manufactory to the Inspector General of Ordnance.*

[o] No. 1223
8th December 1859

13. *Letter^[o] from the Acting Commissary of Ordnance Bangalore to the Inspector General of Ordnance.*

[p] Dated
7th December 1859

15. *Proof Report^[p] of a 9 Pounder Carriage at Bangalore.*

ABSTRACT OF CORRESPONDENCE RELATING TO MAJOR CAMPBELL'S CARRIAGES.

Letter No. 4612 dated 30th August 1859 from the Inspector General of Ordnance to the Secretary Permanent Select Committee, Forwarding Model of 8 Inch Howitzer Carriage and report* thereon for submission to the Committee.

* No. 464.

Letter No. 464 dated 11th May 1858 from Captain T. H. Campbell to the Inspector General of Ordnance.—Intimates despatch of Model 8 Inch Howr. carriage—suggests Established Proof for Carriages of new construction, whether recoil should be stopped, to what extent, distance, and number of rounds.—Many felloes of the wheels on which the carriages were proved were shattered.

Abstract of Notes appended.—Objects aimed at in construction—Strength, lightness, simplicity and durability, obtained by a combination of Wood and Iron.

CONSTRUCTION.—Alternate layers of flat wrought iron and wood, secured together at proper intervals by Bolts.—The body of the carriage is secured on a wrought iron axle between two shoulders.

AXLE.—Forged from Bars of iron 4 × 1 inch.—the shoulders formed from the general mass after welding.

Bolt heads and Nuts have copper washers.—a coating of sheet copper is placed between the axle and body of Carriage.

No dovetail or complicated joining.

The centre bar of iron receives the Elevating screw box, which is independent of support from the wood-work.

Spare component parts proposed to be carried with a Battery.

Facility of removal of parts for repair or replacement.

Will throw out few splinters if struck with shot.

Less liability to injury than other Carriages from exposure to sun and wet, and less likely to require repair.

The Carriage can hardly be so injured as to prevent its carrying its Ordnance off the Field.

Abstract of Report of Proof of an 8 Inch Howitzer Carriage at Bangalore on the 13th June 1857.

Description.	No. of Firings.	Marks on the Carriage.	Weight.		Elevation.		Medium Recoil.		Remarks.	General Remarks.
			cwts. (qrs.)	lbs.	D.	M.	Ft.	Ins.		
18 inch Iron plated Howitzer Carriage.	4	P.	B.	1	7	These rounds were fired on soft sandy ground, trail sunk several inches in consequence—a slight fracture in both side Beams* (Pieces* of wood filling the space between the cheeks and body) which sank $\frac{1}{16}$ of an inch. The firing took place on hard ground. Trail blocked with Pegs which gave way. Fired on hard ground. Trail was sunk about a foot in the ground. Fired on hard ground, The wheels were blocked with stones. Fired on hard ground. The Trail was sunk about a foot in the ground.	The Carriage was also taken at a trot over stony and rough ground, and has altogether had as good a test as possible. No damage otherwise than mentioned was sustained, by the wood or iron work.* Proof conducted as laid down for Extraordinary Proofs.
	26	.....	.....	.....	P.	B.	4	7
	1	.....	.....	.....	6	30	2	5
	2	T.H.C.	.....	.....	0	0	9	2
	1	1857	.....	25	0	0	1	2	
	5	No. 1.	.....	.....	0	0	5	9
	3	.....	.....	.....	6	30	2	5
	4	.....	.....	.....	6	30	9	4
	14	.....	.....	.....	6	30	0	3
	25	.....	.....	.....	10	30	} 0	
18 inch Iron plated Howitzer Carriage.	20	13	15	0	1	Ditto ditto and also the wheels.	
	20	.....	.....	.....	P.	B.	0	1

COMPARATIVE MEMO. OF 8 INCH HOWITZER CARRIAGES.

	Major Campbell's Carriage.	Wrought Iron Carriage with 4 inch Axle.	Wooden Carriage English pattern.
Distance from the ground line to the centre of the Muzzle of the piece at P. B. Feet	3-8	3-8	
Distance from centre to centre of Wheel. "	4-9	4-8 $\frac{1}{2}$	
Lifting weight of Trail..... lbs.	366	441	
Difference of lifting weight in favor of Major Campbell's Carriage..... "	.....	75	
Weight of Carriages..... Cwt.	12-2-23	13-0-9	20-0-23
" " Wheels..... "	8-2-4	8-2-4	8-2-4
A 5 inch square Axletree has been substituted in the wrought Iron Carriage for the 4 inch, difference of weight about "	.....	1-0-0	
Total weight... "	21-0-27	22-2-13	28-2-27
Difference of weight in favor of Major Campbell's Carriage..... "	.....	1-1-14	7-2-0
Angle of Trail, by a line drawn from centre of Trunnion to Trail where it touches the ground and ground line.... Degrees	28	28	
Extreme Elevation by line of sight... "	11-37	11-37	
" Depression..... "	4-30	3-30	

MEMO. OF QUALITIES AIMED AT IN MAJOR CAMPBELL'S CARRIAGES.

- 1st. Strength and durability.
- 2nd. Lightness and reduced bulk.
- 3rd. Simplicity of construction and facility of repair.
- 4th. Reduction in width of axle, to facilitate travelling on Indian roads and through Indian streets.

The 1st. } obtained by the judicious disposal of a small
and 2nd. } quantity of material.

The 3rd. by placing alternate layers of wood and iron side by side, of small weight and bulk.

The 4th. by having no wooden axle case, reducing height of Cheeks to lower the piece.

CONSTRUCTION OF 8 INCH HOWITZER CARRIAGE.

Cheeks.—Each cheek is formed of 2 side pieces of $\frac{1}{2}$ inch sheet Iron with wood between, bolted together, bound round on top and ends by the iron Trunnion plates resting upon the edges of the sheet iron sides, and slightly rivetted over them—Bottom of cheeks supported by a strong plate of Iron secured to the Trunnion Plates, by bolts passing through the cheeks.

Body.—Formed of 3 Bars of wrought iron $5 \times \frac{3}{4}$ inch reduced in depth towards the trail, placed on edge, with layers of wood between, and bolted together—Iron plates at the trail end above and below, and bound by the axle and axle bands in the front. Centre trail bar formed into a tube to receive the Elevating Screw box—Cheeks rabbetted $\frac{3}{4}$ inch deep to rest upon the body—both bolted together are fixed upon the iron axle between 2 shoulders 2 inches high.

PROOF OF FACILITY OF REPAIR.

The component parts being of small dimensions and simple in form and bolted together without dovetailing, the carriages are easy of construction and repair. All the Carriages now submitted to the Committee were built in an Out-station Arsenal without aid from Machinery or other appliances, beyond what can be carried with a Park, excepting a 7 cwt. hammer used in forging the axle.

COST OF MANUFACTURE.

As yet uncertain.—By the aid of Machinery the component parts could be cut and formed in numbers—Labor as cheap as with the present pattern—Less material required.

CARRIAGES FOR ALL CALIBRES ALIKE IN PRINCIPLE OF CONSTRUCTION.

Letter No. 11,869—17th April 1860, from the Acting Inspector General of Ordnance to the Secretary Permanent Select Committee.—Notifies arrival of 3 Carriages* (Captain Campbell's) from Bangalore—Requests their submission to the Select Committee for their opinion.—Forwards Papers and Reports of their Proof, and observes that the results are in the highest degree conclusive as to their strength and capability of meeting uninjured the trial of Service.

* How. 8 Inch 1
 " 24 Pdr. 1
 Gun 6 " 1

} lect Committee.—Notifies arrival of 3 Carriages* (Captain Campbell's) from Bangalore

Letter No. 19, 7th January 1859, from Captain T. H. Campbell to the Acting Inspector General of Ordnance.

Submits Plans and Proof Reports of a 24 Pdr Howr. Carriage—Alterations made consequent on the breaking of a Cheek Bolt at Proof (*A*)—Further altered, causing a reduction of 22lbs. weight (Proof *B*)—suggests its being used with the Horse Battery—Thinks the Carriage may be further reduced in weight, and alterations made to its advantage.

MEMO. OF COMPARATIVE WEIGHTS.

	Weight of Body.			Limbering Weight of Trail in Balance		
	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.
Established Pattern 24-Pounder Howitzer	7	1	25	2	0	22
Major Campbell's 24 „ „	7	0	8	2	0	0

PROOF REPORTS OF 24-POUNDER HOWITZER CARRIAGE.

1st Proof (A.)

Description.	Rounds.	Weight.			Elevation.		Medium Recoil.		Remarks.
		cwts.	qrs.	lbs.	D.	M.	ft.	ins.	
Carriage 24 Pdr. Howzr.	30	.....	.....	.....	P.	B.	5	0	7 Rounds with 2 Wads.
	30	Body.			5	0	6	0	Stood the Proof.
	30	7	1	2	10	0	4	0	
	15	Wheels.			15	0	2	0	Trail sunk. Recoil easy.
		4	0	11					

18th October 1858,

2nd Proof (B.)

Description.	Rounds.	Weight.			Elevation.		Medium Recoil.		Remarks.
		cwts.	qrs.	lbs.	D.	M.	ft.	ins.	
Carriage 24 Pdr. Howzr.	10	.....	.....	.....	P.	B.	5	8	Trail even.
	10	Body.			5	0	5	8	Ditto.
	15	7	0	8	10	0	5	10	Ditto.
	12	Wheels.			15	0	1	0	} Trail sunk.
	3	4	0	11	20	0	0	6	
						

16th December 1858.

Letter No. 126 of 11th February 1859 from the Superintendent Gun Carriage Manufactory to the Inspector General of Ordnance and Magazines.

Submits remarks on the 24-Pounder Howitzer Carriage which appears to have stood the Proof remarkably well. Its strength, lightness and the great desideratum gained by lowering the centre of gravity. Approves of mode of fitting Elevating Screw Box, the weakest point of the E. P. Carriage. Easy of make and repair. The scantling of the timber being so much less is a great advantage. Suggests the Carriage being used with the Artillery, and finally thinks the Carriage the best that has been designed.

Letter No. 776 from Captain Campbell to the Inspector General of Ordnance dated 14th July 1859.

Forwards copy of Captain Scott's report on the 24-Pdr. Howitzer carriage after use for 3 months—Carriage returned in perfect order and the Report most satisfactory.

Letter from Captain J. D. Scott, to Captain T. H. Campbell dated 11th July 1859.

Returns the 24-Pounder Howitzer Carriage after being in use, and considers the closeness of the piece to the axletree advantageous, being less liable to upset, the vent can be served with ease and the sponge worked by *short* men. Considers the Carriage the best he ever had charge of, prefers a Battery of such to the Established Pattern—are lighter, neater, handier and believes stronger.

Letter No. 858, 13 August 1859 from Captain T. H. Campbell to the Inspector General of Ordnance.

The ringing of the metal noticed in Proof considered by Major Campbell of no importance.—The distance between the wheels is the same or nearly as in the ordinary Country Cart.—Wheels of less diameter than usual but the ordinary wheels can be used. Requests instructions as to any further test.

Letter from Captain T. H. Campbell No. 787, 20 July 1859, to the Officer Commanding Artillery Mysore Division.

Requests information from Major Eaton on the following points.

1st. As to a ringing of the metal being observed during Proof.

2nd. As to the probable cause of such ringing.

3rd. As to the likelihood of the men standing nearer to the gun than usual.

Letter from the Officer Commanding C. Troop Horse Artillery, to the Staff Officer of Artillery Bangalore, dated 22 July 1859.

States that an unusual ringing was observed by him—Cannot assign a cause—Was felt by Nos. 4 and 5 at the Gun—Does not think it could be caused by the difference in width between wheels, suggests a trial to discover if owing to peculiarity of Gun.

PROOF OF MAJOR CAMPBELL'S 6-POUNDER CARRIAGE.

Description.	Rounds.	Marks on Carriage.	Weight.			Elevation.		Medium Recoil.		Remarks.
			cwts.	qrs.	lbs.	D.	M.	ft.	ins.	
Major Campbell's Experimental 6-Pdr. Carriage.	30	P.	B.	3	0	The men complained of the unusual ringing. 3 men were deafened, they afterwards stood off. Trail sunk.
	30	.....	.....	.....	.....	7	0	5	0
	30	T. H. C.)	9	0	26	.....	.....	.....	.....
	30	1859. }	.....	.....	.....	11	15	3	4
	15	.....	.....	.....	.....	16	0	2	0

16th July 1859,

COMPARATIVE WEIGHTS OF ESTABLISHED PATTERN AND MAJOR CAMPBELL'S 6-POUNDER CARRIAGE.

	Established Pattern.			Major Campbell's.			
Weight of Body.....	Cwts.	6	0	0	5	0	6
„ „ Wheels.....	„	4	1	17	4	0	20
		<hr/>			<hr/>		
Total...	„	10	1	17	9	0	26

Weight in Scale to start the Trail

off ground... „	1	2	22½	1	2	18
„ „ „ to balance Trail						
after starting it... „	1	2	14	1	2	18

N. B. Gun at P. B.—Trail placed in Scale and Wheels blocked.

Letter No. 1233, 8th December 1859, from the Commissary of Ordnance Bangalore, to the Inspector General of Ordnance

Forwards Proof Report of a 9 Pounder Carriage constructed by Major Campbell, and a Plan.

PROOF REPORT OF MAJOR CAMPBELL'S 9-POUNDER CARRIAGE.

Description.	Rounds.	Marks on Carriage.	Weight.			Elevation.		Medium Recoil.		Remarks.
			cwts.	qrs.	lbs.	D.	M.	ft.	ins.	
Major Campbell's 9-Pounder Carriage.	35	T. H. C. }	Body.			P.	B.	5	4	Carriage stood the Proof uninjured.
	35		5	3	25	7	0	6	0	
	39		Wheels.							
	5		4	1	3	12	0	5	0	
						15	0	4	8	

7th December 1859.

• 8 inch Howitzer Carriage in	1857	OPINION.—Major Campbell has constructed four* Carriages on one general Model, the pro-
24 Pdr.	1858	
9 " Gun "	1859	
6 " " "	1859	

minent feature being a combination of wood and iron for the formation of the Cheeks and Trail, which are connected immediately with the axle without the interposition of the usual "wood casing"

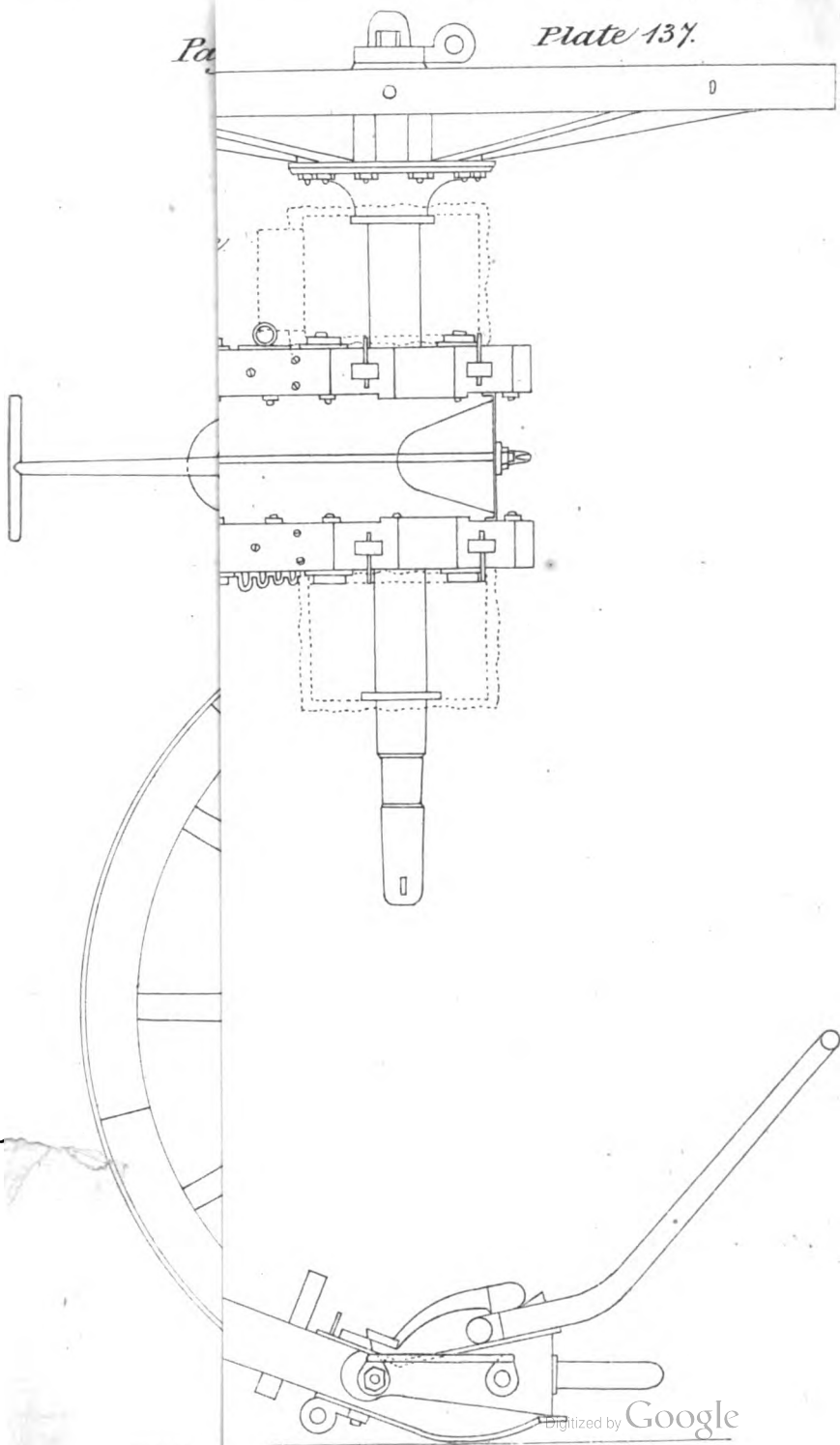
Analogous combinations are well known to Engineers where rigidity of construction is required, as in girders, supports, blocks, &c., in which, the dimensions of the iron having been determined in reference to the strain it is intended to oppose, the wood is added, merely to preserve the normal form of the plate or bar, to prevent its "buckling" and consequent tendency to fracture.

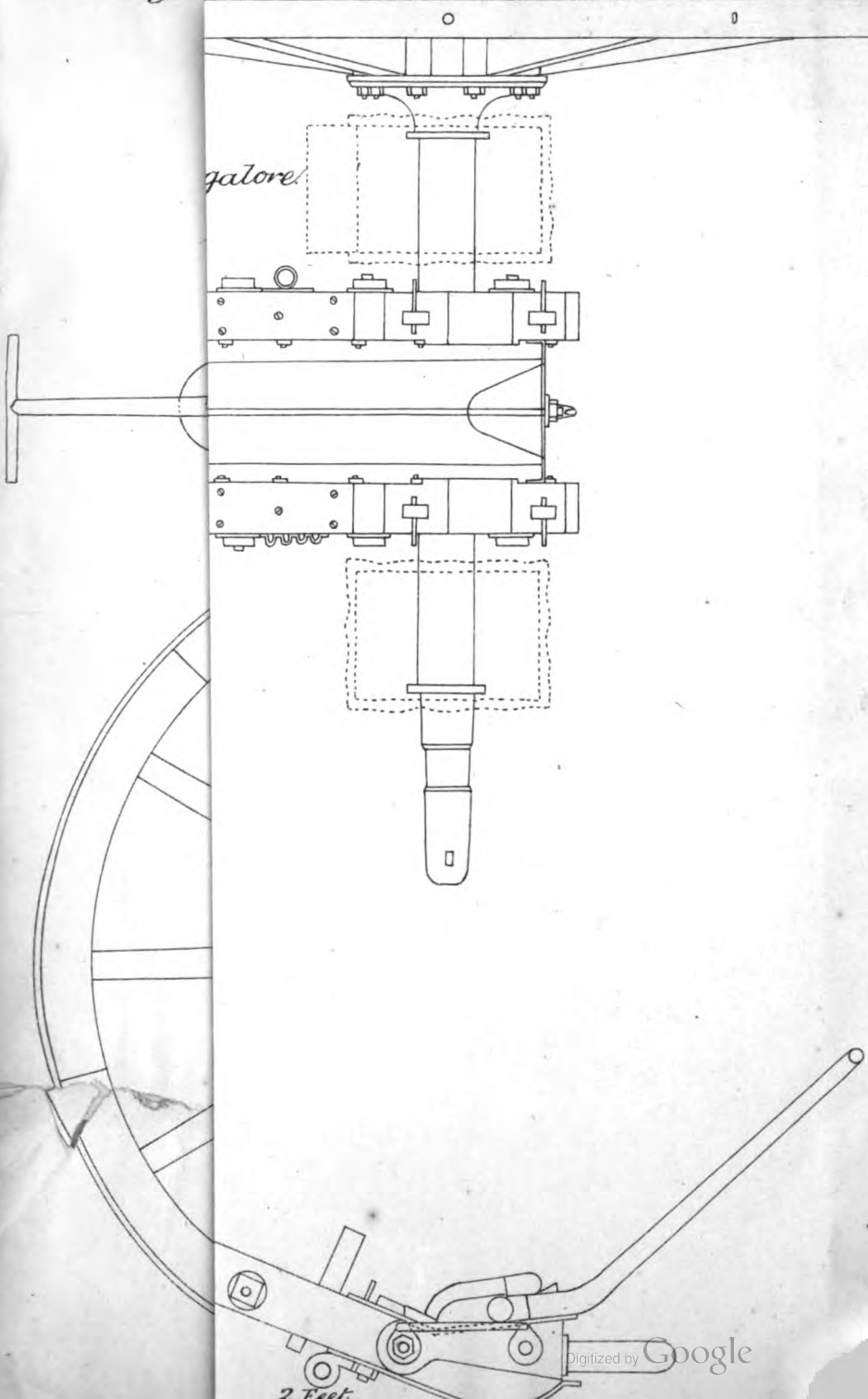
In the present case however, the circumstances are different; and the wood work must be considered as participating in the strain, and essential to the strength of the combination.

The Cheeks of these Carriages are of wood, with thin plates of iron on either side; the trail being similarly formed of a central and two exterior plates, the intervening spaces being filled with stout teak planks; and after the lapse of a considerable period, and having been subjected to unusually severe proof, when inspected by the Committee, appear as sound and perfect as when originally constructed. The junction of the parts were particularly close and even, manifesting the care with which they had been put together and the power inherent in the combination, to resist the shocks and strains to which they had been subjected.

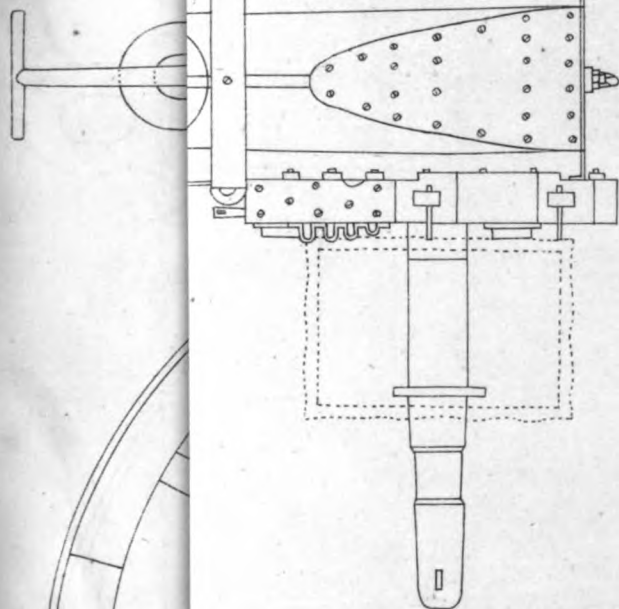
In symmetrical arrangement, and in general profile, these carriages contrast favorably with other patterns; and the 8 Inch Howitzer Carriage deserves especial mention, as a judicious departure from the massive unwieldy form, with which our trains are now encumbered.

Major Campbell has sought to combine "simplicity in construction," with "strength and lightness:" and the Com-

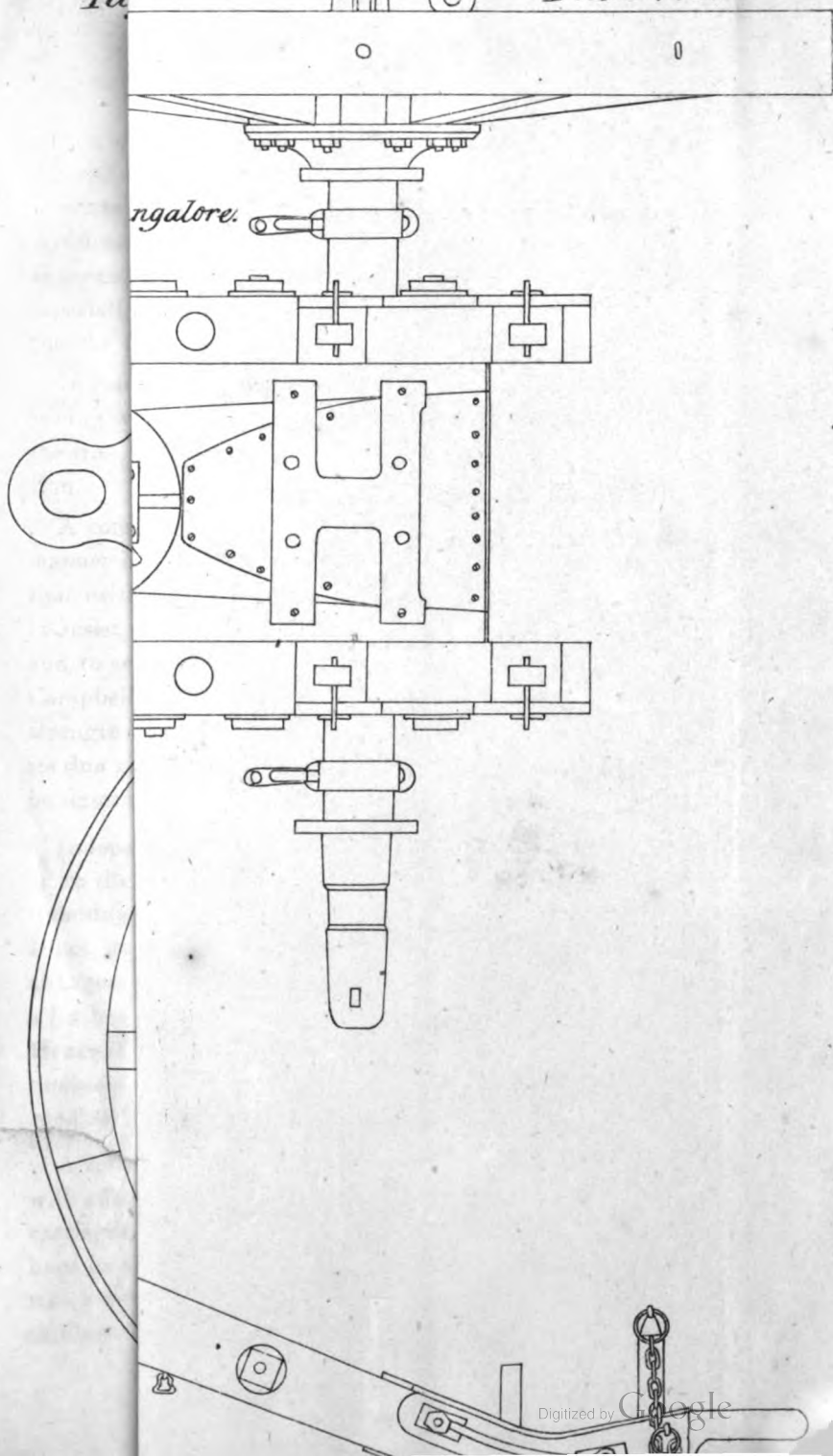




galore



valore.



mittee cannot but consider that the two latter have been successfully attained; but although no part of the Carriage presents difficulties in fabrication beyond the reach of our Artificers to overcome, yet a comparison with present patterns as regards "simplicity, in construction" cannot be admitted; especially if measured by the time required to prepare and put the parts together.

In reference to the strength of the combination, the intervening wood which is applied to other forms merely to stiffen the iron, becomes here an important element in the construction.

A consideration of the forces called into operation, and the manner in which they are opposed, leads to the conclusion, that neither the thin plates, nor the wood alone can effectually resist the strain likely to be imposed on the combination; and to secure the objects sought to be arrived at by Major Campbell, there should probably be a definite ratio in the strength of the separate layers, in order that each may bear its due proportion of the strain, and that the dimensions may be determined without waste of the materials

Independent however of the strength and stiffness imparted to the structure, the wood acts an *important* part in counteracting vibrations in the iron, which not only materially affect its power of resistance, but give rise to molecular changes, which in time lead to sudden disruption, even under a far less strain than the metal was calculated to bear.—Hence it is important that the surfaces should be in *close* and *complete contact*, so that the vibrations may be checked immediately they are generated.

A reference to the accompanying plans (Plates 137 to 140) will afford a clearer insight into the construction of these carriages, than any verbal description; it will therefore perhaps be sufficient to explain, in general terms, the methods which have been adopted to secure the integrity of the whole combination.

Taking the 8-inch Howitzer Carriage as a type of the others, it will be seen that the cheeks (which are slabs of wood enclosed between $\frac{1}{4}$ inch iron plates) are joined to the trail by bolts; side pieces of wood being added, to keep them at the proper distance due to the dimensions of the gun.

The cheeks are firmly bound to the axle by straps, or bands; one being a continuation of the trunnion plates down the front and rear; the other, a plate of iron, or "axle band;" which is bolted through the cheeks, to the trunnion plates. The axle, enlarged or "joggled" on the outer sides of the cheeks, tends to prevent their lateral displacement; it is probable that the "ringing" complained of in the 6-Pounder,

* From a subsequent examination it has been ascertained that the copper which it was evidently the intention of Major Campbell to interpose, was omitted, arises from the contact of iron with iron* at these points. The body of the Carriage is of $\frac{3}{4}$ inch iron 5 inches deep, extending fairly over the axle; with two interposed layers of wood, wedge-form, varying from 5 to 3 inches in breadth and from 6 to $4\frac{3}{4}$ in depth;—screw bolts drawing the plates and layers into as close contact as possible. The central plate is enlarged, for the reception of the elevating screw box.

The solidity of the combination is apparent; and, with ordinary care in preserving the contact, it is scarcely more liable to injury from moisture, than other carriages with iron work of small dimensions about them.

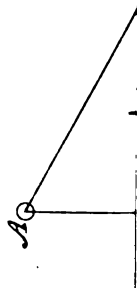
The axles are square;—of large sectional area, but of less length than those at present applied to our carriages.

The length of the axle of the 6-Pounder carriage appears to have been regulated according to the width of the ordinary country carts, on the special requisition of the Inspector General of Ordnance (Colonel Balfour, C. B.)

Artillery Select Committee.
Special Meeting.

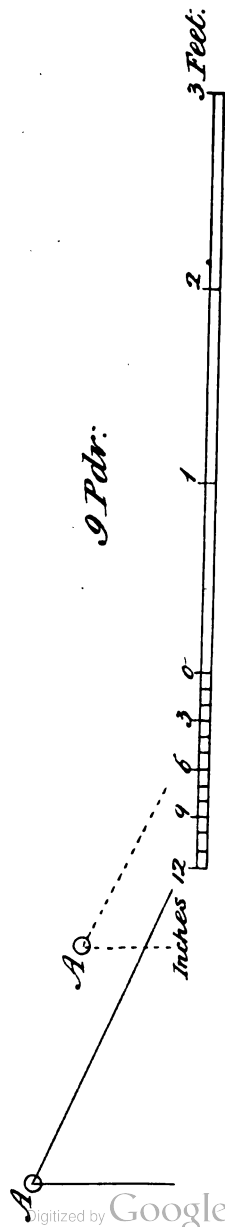
Plate 141.

Diagrams of 6 and 9 Pdr. Gun Carriages.



References.

A. Centre of Trunnion Hole.



N.B. The dotted Lines represent Major Campbell's
and the black Lines the Established Pattern Carriages.

B

8 Inch.

D

Inches 12 9 6 3 0 1 2 3 Feet.

N.B. The dotted Lines represent Major Campbells,
and the black lines the Established Pattern Carriages.

The diagrams (Plates 141 and 142) accompanying the Plans shew the position of the points of support of the gun, length of trail &c.; compared with the "established" pattern. The

* There is a slight disadvantage in the 9-Pounder as regards the angle of the Trail. advantages gained by these deviations are apparent.*

The mean sectional area of the trails of the Carriages are, for the

8 inch Howitzer	about	53·7.
24-Pounder	„ „	40.
9 „ Gun	„ „	33·75.
6 „ „	„ „	27·6.

The ratio of the areas of the iron to the wood are, in the

8 inch Howitzer	as	1 to	4·5.
24-Pdr	„ „	1 „	5·1.
9 „	„ „	1 „	5·5.
6 „	„ „	1 „	4·7.

The relative strengths of the layers of iron and the wood are, for the

8 inch Howitzer	about	1 to	1·23.
24. Pdr.	„ „	1 „	2.
9 „ Gun	„ „	1 „	1·4.
6 „ „	„ „	1 „	1·2.

These are the ratios of *absolute strength* of the parts of the combination, considered as plain beams:—but the question is one of impact, and not of statical pressure. In case however, of this form being extended to other constructions, the ratios here given may serve as a guide; but it will be observed that in *all* the carriages, the greater absolute strength to resist strain, is in the wood.

The annexed Table contains the weights of the carriages and the general nature of the proofs they have undergone ; which latter is decisive as to their strength and completeness.

Table of weights &c. of Major Campbell's Carriages (1) and of the Established pattern Carriages (2.)

Description.	Weight of Body of Carriage.			Counterpoise to Trail.	Length of Trail.		Nature of Proof undergone by Carriages of Major Campbell's pattern.
	cwt.	qrs.	lbs.		ft.	ins.	
(1) 8 inch Howitzer.	12	2	23	None available for comparison.			{ 105 Rounds—Elevation varying from P. B. to 15°. The Trail blocked at times, during the Proof.—59 rounds fired in this way giving only from 1 to 3 inches recoil per round.
(2) Ditto.	0	0	0				
(1) 24-Pdr. Howitzer.	7	0	8	181½	8	3	{ 155 Rounds—Elevation varying from P. B. to 20°. The Trail sunk in the ground, during 30 rounds.
(2) Ditto.	7	0	20	167	9	2	
(1) 9-Pdr. Gun....	5	3	25	179	7	4½	{ 105 Rounds—Elevation varying from P. B. to 15°.
(2) Ditto.	6	2	10	164½	9	3½	
(1) 6-Pdr. Gun....	5	0	6	152	7	2	{ 105 Rounds—Elevation varying from P. B. to 16°. The Trail sunk in the ground during 15 rounds.
(2) Ditto.	5	2	10	140½	9	0	

Major Campbell has however reduced the length of the axles, whilst the other dimensions have been increased ; hence this fact must have weight, in comparison with future constructions (should such be contemplated,) having the established length of axle.

It will be observed that there is considerable reduction in weight in the Light Field Carriages ; which, while it does not appear to have had any prejudicial influence under proof and other trials, must yield important advantages in draught. Experiments however to determine the force of traction

were not so definite on this point, as might have been expected.

In limbering and unlimbering, there appears to be little difference in the present and established patterns; though the "counterpoise to the trail" indicates that a slight advantage has been obtained by Major Campbell.

The "recoil" is "stated to be easy;" and particular attention has been directed to the fact, (as an indication of the strength of the combination,) that the "recoil" reported as 1 inch, was literally no recoil at all, from the manner in which the trail was blocked.

Looking therefore to the proof these carriages have undergone, and to the general merits of the combination, the Committee is disposed to consider this form of construction, under some modification as to arrangement of the parts, adequate to meet the altering requirements of Artillery construction, with every probability of success.

As regards the durability of the materials, it is well known that the peculiar "oleo-resinous" properties of teak have a decided *conservative* influence on iron, in conjunction with it; and the Committee do not apprehend that the permanency of the combination will be at all affected, as compared with plain woods which enter into our constructions.

It is usual to protect the metal with white lead, or other conservative coating; but with teak in fair and immediate contact with iron, such applications would appear to be quite unnecessary.

Oxygen is said to be less abundant in teak than in other woods; hence the immediate cause of corrosion and decay is less active: and so long as the wood retains its resinous particles, the action of the iron is also rendered inoperative; and it may be anticipated that neither are liable to other than that gradual decomposition, common to all materials.

In conclusion the Committee would express a desire that the plans and description of these Carriages should be forwarded by Government to the Select Committee of the Royal Artillery; with details of Proof, Weight, &c., with the view to interchange of opinion on a subject, which, at the present juncture, is of considerable moment.

Observations of the Acting Inspector General of Ordnance and Magazines.—The Acting Inspector General concurs in the general reasoning, and opinions, embodied in the carefully prepared Report of the Select Committee, and supports the request that the whole of the Papers be forwarded to the Select Committee of the Royal Artillery, as this combination of Wood and Iron seems to present special advantages in the construction of Carriages for Armstrong's Rifled Guns.

Remarks by the Brigadier Commandant of Artillery.

I cannot understand how these Carriages can be introduced to replace a solid beam trail and called simplicity of construction, when the main feature is a combination of iron and wood, which practice has shewn are most difficult to be kept together; the simplicity of repair noticed is still more difficult to reconcile. In a manufactory yard where the best materials are available the repairs might be executed, but in the Field away from all resources, where an inferior material is only procurable, and wood probably green or of a description that contains no oily matter, their repair would be impossible; they might be botched up so as to enable the gun to travel, but the Carriage could not be expected to stand the strain of firing. If the iron band behind the Elevating screw snapped, which after exposure to bad weather would be likely to happen, the least swelling of the wood would cause the trail binding bolts to give way. The Carriages are remarkably well constructed, but I should be sorry to see them or any other complicated pattern introduced in lieu of the solid beam trail.

I quite agree with the Committee in their concluding remark, that the Plans, Proofs &c. be communicated to the authorities at Woolwich.

(a.) No. 751
15th August 1860

Observations of the Commander-in-Chief in letter^(a) from the Adjutant General of the Army Fort Saint George to the Secretary to Government, Military Department.—As suggested by the Select Committee, His Excellency recommends that the papers may be forwarded for the consideration of the Select Committee of the Royal Artillery at Woolwich.

Orders of Government.—The Governor in Council approves of the papers submitted with the foregoing letter, being forwarded as proposed, to the Select Committee of the Royal Artillery at Woolwich.

REPORT UPON A NEW CONSTRUCTION FOR FIELD ARTILLERY CARRIAGES, PROPOSED BY MAJOR T. H. CAMPBELL MADRAS ARTILLERY.

Port Saint George

Madras 1st August 1860.

Having been requested by Major Campbell to give an opinion upon his new pattern of Field Artillery Carriage, I accordingly carefully inspected several made upon his plan, in order to ascertain their principles of construction ; and I was also furnished by him with details of their manufacture, the results of proofs, and other information necessary for the purpose.

I propose to divide my report as follows :—

- (1) General principles of construction.
- (2) Advantages and results.

With regard to the first, Major Campbell proposes that instead of making the bodies and block trails of Field Artillery Carriages, as at present of solid beams, they should be constructed of three thin longitudinal strips or plates of

wrought iron, placed with their edges uppermost, having broad pieces of wooden bedding between them. Two of the iron strips form the outside of the trail, and the third runs up the centre, the elevating screw passing in a tube through it.

The whole of the iron strips or plates run in a straight line throughout, from the end of the trail to the other extremity of the body.—The dimensions of these wrought iron plates differ of course slightly with the nature of the carriage, but with a 9-pounder they are about $\frac{1}{4}$ an inch in thickness or width.—The cheeks of the carriages are made on the same principle as the body and trail, the outside cases being sheet iron and the centres wood. The edges of the cheeks are also plated, so that in fact they are thin iron cases filled with wood.

The component parts of the body and trail and also of the cheeks are securely bolted together, and the body and cheeks are combined in the same way, the whole thus forming one solidified mass secured between two high shoulders of a wrought-iron-axle.

It is also necessary to add that owing to the great strength of construction, Major Campbell is enabled to bury the greater part of the axletree in the body of the carriage; the latter is consequently brought nearer to the ground which lowers the centre of gravity, and the trail can therefore be shortened without altering the usual angle of incidence.

Such are the general principles of Major Campbell's proposed carriage.

Advantages and results.

It is evident at once that its strength mainly depends upon the iron longitudinal plates and it is also evident that by being placed edgeways, these plates thus receive the great concussion produced by firing the gun, upon their strongest parts; or in other words, their greatest line of strength meets the severest line of concussion.—The intermediate wooden

beddings serving to support the iron, to distribute the shock, and to prevent the plates from warping.

Dimensions Owing to the strength of the materials of which the carriage is composed, the general dimensions are less than in the present wooden ones, and what perhaps would hardly be expected the weights are also less.—As appears from the following comparison.

			cwt.	qrs.	lbs.
Weight.	Weight of Major Campbell's new Carriage...	„	10	1	0
	„ Madras Artillery	„	10	3	16
	„ Royal Artillery	„	12	0	19

Simplicity of construction. Major Campbell's proposed carriage also appears simple and economical in its construction in so far that there is not a dovetail or complicated joining in any part of it—The iron plates are plain and of easy manufacture—
Beams of large scantling not required. the wooden parts are small in scantling, and the necessity therefore of procuring large well-seasoned beams, of choice woods, as in the present ones, is obviated, and it is probable, from the last mentioned circumstance that the general cost would be reduced.

Facility of repair. Another advantage which the new carriage appears to possess, is that it can be taken to pieces, and its component parts repaired or replaced as occasion may require; and also should it show symptoms of opening out or suffering from climate, it can be tightened by screwing up the bolts; whereas the large solid beams of which the present carriages are composed do not equally admit of repair or correction in that way; and this in tropical climates is important.

It is perhaps not possible to pronounce any decided opinion as to the results which might be expected if Major Campbell's carriage were struck by an enemy's shot in action, but it would appear less liable to splinter than the present ones; and it would I think also be difficult to strike the

trail, in such a manner, as to break all the iron plates at once, and so render the Carriage absolutely unserviceable.

The best test however of the strength and serviceable nature of the carriage, is of course only to be obtained by actual experiment.

Proofs

For this purpose several carriages made upon Major Campbell's principle have been tested by firing from them upwards of 100 rounds each, with service charges, at elevations varying from Point Blank to 20 degrees.

In many of the rounds the wheels and trails were sunk into the earth so as to prevent all recoil, and thereby to put the carriages to a severe test, and strain, and the result was that the carriages remained uninjured, the bolts stood firm, and to all appearance, the carriages are as good as ever; indeed, Major Campbell is of opinion that they could not be broken by any ordinary usage, such as they might be exposed to on service; and as far as can be judged by an inspection of them, they seem to bear out his views.

As a general principle it appears to me that the combination of wrought-iron plates with intermediate wooden bedding, is the proper one for field carriages and since I have had the opportunity of inspecting those made by Major Campbell that opinion has been considerably strengthened, as his proposal appears to combine strength, lightness, simplicity, and durability, and I can perceive no counteracting disadvantages.

(Signed) JOHN ADYE, Lieut.-Col.

Commanding R. A. Madras Presidency.

Orders of Government on the foregoing Report.—Ordered that the Report be transmitted, with the papers on the same subject, to the Select Committee of the Royal Artillery at Woolwich.

MEETING 212.

EXTRACT FROM THE PROCEEDINGS OF THE MADRAS PERMANENT SELECT COMMITTEE OF ARTILLERY OFFICERS, ASSEMBLED BY ORDER OF COLONEL E. AMSICK BRIGADIER COMMANDANT OF ARTILLERY.

Artillery Depot St. Thomas' Mount 8th May 1860.

PRESENT.

LIEUT.-COL. G. BRIGGS, *Commanding 1st Battalion Artillery.*
 LIEUT.-COL. J. MAITLAND, *Superintendent Gun Carriage Manufactory.*
 LIEUT.-COL. C. J. COOKE, *Commanding 5th Battalion Artillery.*
 MAJOR. B. W. BLACK, *Director Artillery Depot.*
 LIEUT.-COL. J. L. BARROW, *Acting Principal Commissary of Ordnance.*
 CAPTAIN W. C. F. GOSLING, *Commanding Madras Artillery Recruit Depot.*
 CAPTAIN S. R. SMITH, *Commanding B. Company 3rd Battalion Artillery.*

ARTICLE 836.

ON THE SYSTEM OF EXAMINATION AND PROOF OF ORDNANCE CARRIAGES CONSTRUCTED AT THE GUN CARRIAGE MANUFACTORY.

The undermentioned documents are laid before the Committee.

(a) Meeting 210
 Article 826
 Page 839 Artillery
 Records.

(b) No. 10349.
 28th February 1860
 Page 841 Artillery
 Records:

1.—*Former Proceedings^(a) of the Select Committee on the same subject, and the documents therein enumerated.*

2.—*Observations^(b) of the Acting Inspector General of Ordnance upon the Opinion recorded by the Committee in the same Proceedings.*

REVISED OPINION.—The Committee are under the apprehension that the use by them of the words "Established pattern" in their general sense as applicable to Carriages of all descriptions which have been approved of, have been received in the limited sense as the official designation of the Light Field Carriages last adopted, in contradistinction to other Light Field Carriages of previous constructions, which are still retained in use with Light Field Batteries.

2.—Failures to the extent of 10 out of 220 Carriages known by the name "*Established Pattern*" or $4\frac{1}{2}$ per cent., having indicated the expediency of strengthening Carriages of this pattern, the Committee in recognition of this necessity

• Article 824
Meeting 288
Page 523 Artillery
Records.

have already recommended* that one Carriage of the "*Established Pattern*" for each calibre of Light Field Ordnance be strengthened and afterwards subjected to a very severe proof by firing and travelling—and the Committee believe that after the measure now referred to and already approved of by Government† shall have been carried out, the systematic Proof of all Carriages of this class may then be dispensed with.

† No. 865
29th February 1860.

Observations of the Acting Inspector General of Ordnance on Article 836.—States that remarks will be offered on the question discussed therein, when the results of Proofs of the strengthened Carriages come under consideration.

Observations of the Brigadier Commandant of Artillery on Article 836.—Light Field Carriages are not likely to shew defects when first issued from the Manufactory by any proof, but if tested at the expiration of the next hot season on the Drill ground without firing, or with common firing as at Exercise, the defects are more likely to become visible.

(c) No. 613
29th June 1860.

Observation of the Commander in Chief on Article 836, in letter(c) from the Adjutant General of the Army Fort Saint George, to the Secretary to Government Military Department.—In reference to the "*Established Pattern*" Field Gun Carriage, the Commander in Chief agrees with the Commandant, that the test proposed by the Select Committee is not sufficient, and that further trial after the expiry of a year from the date of Carriages being brought into use, is indispensable.

Orders of Government on Article 836.—The Governor in Council concurs with the Commander in Chief, that the test proposed is insufficient. This question will however

come under consideration again, on the receipt of the Report of the trial on the alterations sanctioned to Article 824, Meeting 208, in the order of Government No. 865, of the 29th February 1860.

ARTICLE 837.

ON THE CONDITION OF THE CARRIAGES AND WAGGONS RECENTLY ON FIELD SERVICE WITH THE $\frac{1}{2}$ E. TROOP MADRAS HORSE ARTILLERY.

(a.) No. 851
23rd May 1859

The Inspector General forwards^(a) the undermentioned documents on the above subject for submission to the Select Committee.

(b.) Dated
26th March 1859

1.—*Proceedings^(b) of a Committee of Survey assembled at Secunderabad on Carriages of the $\frac{1}{2}$ E. Troop Horse Artillery.*—The Committee find them with very trifling exceptions in a serviceable condition, and considering the distance marched, and the nature of the country traversed, that the carriages have stood *remarkably* well.—Suggest the use of *leather* straps in lieu of rope lashings for attaching the boxes to the Carriages.—Notice the very great friction, causing serious injury to both *axletree-arms* and boxes from the defective construction of the former, they do not contain a sufficient quantity of grease.—This defect does not exist in the axletrees of the Royal pattern.—One Limber box made of *Deal* appears to have suffered more than the others made of teak.

(c.) No. 213
31st March 1859

2.—*Letter^(c) from the Officer Commanding Artillery H. S. Force, to the Assistant Adjutant General H. S. Force.*—Remarks on the above Proceedings that.—“ The Committee appear to have misapprehended the object for which I presume the Major General Commanding, directed its assembly, namely, to ascertain the present actual state of efficiency of the Carriages &c.

“ in question, after having undergone during so many months
 “ the severe test of long marches over bad roads and mere
 “ jungle tracks.—To have effected this purpose the Commit-
 “ tee should have severally and minutely inspected the prin-
 “ cipal component parts of the Carriages, Waggon and
 “ Limbers, such as the Cheeks, Beams, Trails, Wheels, Poles,
 “ Limber and Waggon framings, short perches, Axletrees,
 “ Pintle hooks and loops, likewise the Ammunition boxes,
 “ and reported on the state they found them in generally
 “ when serviceable, particularly, when repairable or un-
 “ viceable:—if repairable the nature and extent of the re-
 “ pairs required—if unserviceable the probable cause of their
 “ having become so, and the description and extent of injury
 “ sustained. I do not apprehend that it was intended that
 “ any comparison should be instituted between these Car-
 “ riages and their fitness, and those of the Royal Artillery.”

[d.] Dated 8th April

1859.

• Plates 143, 144 and 145

3—*Report^(d) of the Acting Commissary
 of Ordnance H. S. Force on the above
 mentioned Carriages, and three Sketches.**

Report on the Carriages of Right Half E Troop M. H. Artillery recently returned from Field Service—Arsenal Secunderabad 8th April 1889.

Description.	Number.	Marks.		Weight.	Condi- tion.	Increase in Diameter of Nave Box.						Remarks.	
						Left Wheel.			Right Wheel.				
						Small End.	Large End.	Inches.	Small End.	Large End.	Inches.		
Carriage Howitzer 12-Pdr.	1	J. H. F.	1839	13 11	1 12	0	1	0	3	0	3	0 25	Axletree bed much split in several parts; left wheel, one fellie much cracked, right wheel two fellies cracked, friction plates much worn, axletree arms worn away at small end one-tenth of an inch, "Tires" tight, but slightly worn. Axle arms worn away at the points one tenth of an inch, Ammunition Boxes, Lids, and sides more or less split, short perch slightly split from a severe shock on pintle hook. Right wheel two fellies split, left wheel one fellie split. Tire of left wheel very slightly loosened, tire of right wheel tight, but little worn.
Limber with Boxes Howitzer 12-Pdr.;	1	J. H. F.	1839	13 10	2 19	0	1	0	2	0	1	0 5	Axletree arms slightly worn at the ends; right wheel one spoke broken and two fellies split; left wheel two spokes cracked, tire of left wheel a little loose. Tire of right wheel tight, but little worn.
Carriage Howitzer 12-Pdr.	1	J. M.	1853	3 11	0 25	0	1	0	3	0	1	0 3	Left wheel one spoke cracked; Ammunition Boxes (Deal Wood) quite shattered, axletree arms very slightly worn, tires of both wheels tight and good, Right axletree arm worn away one-tenth of an inch at shoulder, right wheel two fellies cracked, left wheel three fellies and one spoke much cracked, axletree bed fractured in the centre, one small axletree box broken, rivet and neck of pintle loop worn, and socket in trail plate enlarged from friction.
Limber with Boxes Howitzer 12-Pdr.;	1	J. M.	1853	3 9	1 6	0	1	0	2	0	2	0 5	
Carriage Howitzer 12-Pdr.	1	J. M.	1848	5 11	2 25	0	1	0	3	0	15	0 2	

Waggon Body.....	1	J. M.	1843	9 13	3	7	0	1	0	0 65	0 15	0	3	0	1	<p>Left wheel three fellyes slightly cracked, right wheel fellyes are slightly separated from each other on the inner circumference of the wheel, one spoke broken, axle-tree arms worn away one tenth of an inch at the points, tire of right wheel slightly loosened, tire on left wheel quite tight.</p> <p>Right wheel one fellye splintered, and two slightly cracked, left wheel two fellyes broken, the bottom of one ammunition box broken, tire of left wheel a little loose, tire on right wheel quite tight, left axle arm worn one tenth of an inch at point.</p> <p>Right wheel one spoke splintered, and one fellye slightly cracked; left wheel one fellye and one spoke cracked, axle-tree arms very slightly worn, ammunition boxes four sides and two tops split, tire of right wheel loosened a little, tire of left wheel quite tight.</p> <p>Right wheel two fellyes split. This is evidently an old wheel having much more dish than wheels built since 1857, tire of right wheel a little loosened, tire of left wheel quite tight.</p> <p>A sketch of the worst wheel is herewith forwarded which will show the nature of the cracks in nearly all the fellyes reported cracked.</p>
Waggon Limber with Boxes.....	1	J. M.	1843	9 11	1	24	0	1	0	0	4	0	1	0	2	0
Waggon Body.....	1	J. M.	1857	175	11	1	27	0	1	0	0 55	0	1	0	3	0
Waggon Limber with Boxes.....	1	J. M.	1857	175	10	0	3	0	1	0	0	2	0	1	0 55	0 15

(Signed) A. N. Scott, Captain,

Acting Commissary of Ordnance

Hyderabad Subsidiary Force.

[c.] No. 267
15th April 1859

4.—*Letter^(c) from the Officer Commanding Artillery H. S. Force, to the Assistant Adjutant General H. S. Force.*—Forwards the above Report and observes.—“ The Carriages of the $\frac{1}{2}$ E. Troop were exposed on Field service from the 16th November 1858, to the 22nd. March 1859, to the weather, and to repeated long marches over bad roads or across country where no roads were in existence, but they have suffered much less injury than might have been expected, owing in some measure to the care with which the wheels were last tyred. Nearly all the spokes are in good order, not so the fellies, several of which are cracked. The nave boxes are much worn, owing, either to want of proper and frequent greasing, or to the grease used for lubricating the axletree arms, melting away too rapidly and leaving them unprotected. The ammunition boxes constructed of Deal have suffered more than those of Teak.—The present mode of rabbiting these boxes together at the angles, does not appear to answer so well as dove-tailing them together,”

“ The evil of a fixed pintle-loop is clearly exemplified by
• Plates 143 and 145. “ the accompanying drawings* of a fractured waggon beam, and twisted pintle hook. Had the loop in this instance been on the swivel principle, it is most probable that the waggon would have simply capsized and sustained no further injury.”

(f.) No. 51
19th April 1859

5.—*Letter^(f) from the Officer Commanding H. S. Force to the Adjutant General of the Army.*—Submits the foregoing Proceedings of Committee, Report of Commissary of Ordnance with Drawings, and two letters from Colonel Moore, C. B., Commanding Artillery H. S. Force.

(g.) No. 386
19th May 1859.

6.—*Letter^(g) from Lieut.-Colonel J. Maitland, Superintendent Gun Carriage Manufactory to the Inspector General of Ordnance.*—States that

the conclusions he has drawn from a perusal of the foregoing correspondence are:—

1st.—“ That the Madras Artillery in following the suggestions of the Special Board of Artillery Officers, which assembled in Calcutta in 1837, and adopting straight axle arms, have been misled, and that it is absolutely necessary to retrace our steps and follow our former practice, and the practice of the Royal, Bengal, and Bombay Artilleries which coincides with the experience of every Coach and Cart-builder in the United-Kingdom.”

2ndly.—“ I do not concur with Colonel Turner’s Committee that Leather straps are equal to rope as fastenings for the Ammunition and Store Boxes; the Leather strap when new, looks pretty, but to stand all weathers, and for facility of replacing these fastenings, I greatly prefer rope.”

3dly.—“ I desire to see the felloes of all our Carriages made of some tougher wood than Teak, and to effect this I am cutting them out of Peemah and Peddowk. These Carriage wheels seem to have suffered considerably, but it is probable many of the cracks are not of importance, or the Committee would not have said that the Carriages have stood remarkably well.”

4thly.—“ This is a confirmation of my opinion when reporting on the Royal Artillery Carriages, when I predicted that Deal wood Ammunition Boxes would not answer, as they are not sufficiently strong to stand the exposure and wear and tear of service.”

OPINION.—The Committee having perused these papers observe, that all the points referred to in them have already been met by previous proceedings and opinions.

Observations of the Brigadier Commandant of Artillery on Article 837.—From the opinion recorded by the Committee, it would appear that all points complained of, have been rectified, therefore any opinion from me is unnecessary.

ARTICLE 838.

ON THE CONDITION OF THE CARRIAGES OF THE H. BATTERY
ROYAL HORSE ARTILLERY AND THE PREFERENCE GIVEN
TO THE RING RATHER THAN THE STREAK TIRE.

Copies of correspondence on the subject of the condition
of the Carriages of the H. Battery Royal Horse Artillery
and the preference given to the Ring rather than the Streak
tire for the wheels of the Royal Artillery
Carriages are forwarded^(a) by the Inspector
General of Ordnance for submission to the Select Committee.

(a.) No 2696
13th July 1859

*Letter^(b) from the Officer Commanding
H. S. Force to the Inspector General of
Ordnance.*—Forwards a Statement^(c) from Captain Campbell
Commanding H. Troop Royal Horse Artillery respecting
the wheels which have been ring tired, and that he quite con-
curs with him in the view he takes of the subject.

(c.) No. 31
25th June 1859

*Letter^(c) from the Officer Commanding H.
Battery, Horse Brigade Royal Artillery H.
S. Force, to the Officer Commanding Royal Artillery H. S.
Force.*—Reports that some wheels of the Battery that have
been fitted with ring tires, have answered remarkably well.

Considers ring tires to be far preferable in every respect to
the streak tire.—The ring tire binds the wheel together, makes
it much stronger, and renders repairs less frequently neces-
sary.—The only possible disadvantage is that in the event of
a Spoke or Felloe breaking on the march, the whole tire has
to be removed which seems a formidable operation,—but has
been given to understand it can be done without much diffi-
culty.

Mentions, as a proof of the great superiority of ring tires,
“ that several wheels were made at Madras after our own
“ pattern of Teak ;—on a trial of these being made over
“ moderately rough ground, they proved quite unserviceable ;
“ we rarely went out to exercise without breaking one or more

“ of them, some of those that remained have been fitted with
 “ ring tires, and though the additional holes that had to be
 “ bored in the felloes for this purpose, must have tended to
 “ weaken the wheels, yet they have lasted well since.”

[d.] No. 513
 5th July 1859

*Letter^[d] from the Officer Commanding
 Royal Artillery, Madras Presidency to the
 Inspector General of Ordnance.*—Forwards copy of a report
 on the Carriages of the H. Battery Royal Horse Artillery,
 stationed at Secunderabad, the contents of which he conceives
 may be of interest to the Superintendent Gun Carriage
 Manufactory.

[c.] Dated
 20th June 1859

*Proceedings^[c] of a Board of Officers
 assembled at Trimulgherry Barracks, to
 examine and report upon the state of the Carriages of H. Battery
 Horse Brigades Royal Artillery.*—The Board state:—

“ *Carriage Bodies.*—First, with regard to the bodies of the
 “ Carriages.—The wood work has shrunk and rendered it
 “ necessary to screw up the bolts occasionally, but the wood
 “ appears quite sound, with the exception of one axletree-
 “ bed which has split, but not to such an extent as to render
 “ it unserviceable.”

“ *Ammunition Boxes.*”—Second, with regard to the Am-
 “ munition Boxes, some of the sides of the boxes have small
 “ splits in them, but are not rendered unserviceable thereby,
 “ and appear to have stood the climate remarkably well.”

“ *Wheels.*”—Third, with regard to the wheels. These
 “ appear to have suffered most from the effects of the climate.
 “ But it appears that when the English made wheels have
 “ been ring tired, they stand very well, none having broken
 “ that have been so treated. Teak wood felloes will not
 “ stand without being ring tired. Half the wheels of the
 “ Battery have been ring tired.—When the whole are com-
 “ pleted with ring tires, the wheels of the Battery will be in
 “ a serviceable state.”

“ The Board beg to remark that the repairs done to these wheels in the Secunderabad Arsenal, have been very badly executed.”

“ In conclusion the Board is of opinion as far as they have been able to judge, the present condition of the Carriages is good, and that they will remain serviceable for some time longer.”

[c.] No. 81
24th June 1859

Letter^[c] from Captain C. Wright, Commanding Royal Artillery H. S. Force, to the Adjutant Royal Artillery Fort Saint George.—Forwards the foregoing Proceedings, as well as the remarks of Captain Campbell Commanding the Troop.—Thinks it would be advantageous that the whole of the wheels should be ring tired, and suggests that an order for that purpose should be obtained from the Inspector General of Ordnance. Although the Board have expressed dissatisfaction at the repairs executed in the Arsenal, yet the Officer Commanding the Troops does not find any fault with the work.

Letter from Captain P. J. Campbell, Commanding H. Battery, Horse Brigade Royal Artillery, Secunderabad, to the Adjutant Royal Artillery.

“ In addition to the Proceedings of the Board assembled to examine and report on the condition of the Carriages of the H. Battery Horse Brigade Royal Artillery under my command I venture to offer the following remarks, the result of my own experience.”

“ The Carriages of the Battery are of seasoned English wood, they mostly bear the date of 1847-48, and I believe formerly belonged to the A. Troop Royal Horse Artillery.”

“ *Description and original condition of the Carriages.* They were on the whole in excellent order when we received them from the Arsenal at Woolwich, (September 1857,) but a few flaws were subsequently discovered, and none was found to be rotten.”

“ The Battery was stationed at Saint Thomas’ Mount, from its arrival in December 1857 to December 1858, during which time the Carriages were under cover.”

“ *Effects of climate.*—The heat of the climate soon began to show its effects, the felloes and spokes shrunk, and the latter became loose in their mortices, old cracks widened, and a few new ones appeared, but still nothing materially to affect their efficiency.”

“ Having heard most alarming accounts of the effects of the climate, together with confident predictions that they would all fall to pieces should the Battery be ordered to march, the Carriages were sent to the Arsenal at Madras to be repaired; several spokes and felloes that were supposed to be defective were replaced by others made of Teak. We have since had reason to repent this step; in almost every instance where the spoke or felloe has given way it has been

Teak Wheels. among those made in this country, and 20 additional wheels made in Madras (of Teak) after our own pattern, have proved utterly unserviceable, we rarely went out to exercise without shattering one or more of them.”

“ *March to Secunderabad.*—In December 1858, the Battery marched to Secunderabad; though it was the winter season, the sun was very powerful, yet the Carriages though constantly exposed to its influence for fully 3 months (1 month after arrival) suffered little injury, the wood warped and shrunk in some places, but by keeping the naves covered with cow-dung, and the bolts well screwed up, they arrived in a serviceable condition (though somewhat shaken.)

“ *Repaired at the Arsenal.*—They were soon afterwards sent to the Arsenal to be examined and repaired, this was certainly required, but they could have undergone a much longer march without material injury.”

"*Ring Tires introduced.*—About 40 of the wheels were fitted with ring tires, and they will be I hope gradually applied to the remainder."

"The Battery will then be fit for any service ;—even now I should anticipate few casualties, (if any) but streaked tired wheels cannot always be depended upon, particularly if some of the felloes or spokes happen to be made of country wood."

"*Present condition of the Carriages.*—The naves are as sound as on the day they left Woolwich, and the frame-work of the Carriages, as well as the Ammunition Boxes, have stood the climate remarkably well."

"*English wood superior.*—I am of opinion that seasoned English wood is far superior to any that can be procured in this country."

"*Ring Tires preferable.*—I am an advocate for the ring tire, it binds the wheel together, and makes it much stronger ; a Teak wheel with ring tire will stand well, whereas the same wheel with the streak tire falls to pieces at once. It has

Disadvantages. however the draw-back that wheels made on this principle cannot be so easily repaired, as the whole tire has to be taken off to replace an injured spoke or felloe.

"*Precautions necessary.*—There is no doubt that the climate has a great effect on all Carriages, and much precaution is necessary to keep them efficient, the naves should be kept covered with cow-dung (if exposed,) and all the bolts, &c. require constant screwing up, but I think if proper attention is paid to those points, they will stand as well as the Carriages made in this country."

"I have had no experience of the Madras Artillery Carriages. Major Godby's Battery at this station is equipped with them, they are very neat in appearance, a 9-Pounder Carriage looks as light as one of our 6-Pounders, the wheels appear good, and I hear the metal nave highly spoken of."

